



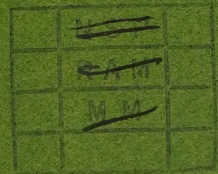
ZANZIBAR PROTECTORATE

Annual Report
of the
Department of Agriculture
1958

ZANZIBAR

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Annual Report of the Department of Agriculture, 1958

SECTION A.—AGRICULTURE IN THE PROTECTORATE

1. General

From both agricultural and economic points of view the most important features of the year were the difficulties and uncertainties connected with the financing and marketing of the record crop of cloves harvested in 1957. With the cessation of clove buying by the Clove Growers Association in December, 1957, the price of cloves gradually fell to less than half of its previous value and remained there for some months. The price recovered somewhat in July and in August the price was stabilised at about Shs. 110/- per hundred pounds when the Association was able to announce a new floor price and resume clove purchasing.

The great difficulties experienced in financing the purchase and holding of record stocks of cloves were little appreciated by the majority of the planting community but their confidence in cloves continuing to be a satisfactory and reliable future means of support was badly shaken by the decrease in prices which many of them experienced during the year. A section of the public which a few years ago was criticising the expenditure on agricultural research and the search for alternative crops rather changed its attitude and wished to know from the department what crops it could recommend. There is still however little evidence that the planting community has been persuaded that alternative crops are necessary nor has it yet shown in any determined practical way, by ordering planting material or by planting, that it intends to establish them on any appreciable scale.

At the request of an *ad hoc* Committee on Education set up during the year, the Director of Agriculture submitted his views on the future prospects of agriculture in the Protectorate to the Committee in a 36 page booklet. It is hoped that the report will assist in clarifying the possibilities and difficulties in regard to broadening the agricultural economy.

Although 1958 saw a fall in clove prices, there was an unusual buoyancy in the coconut and copra trade. For a period there was almost a boom rush to export whole coconuts to markets in the United Kingdom and the Continent previously supplied by Ceylon, while the demand for copra was strong throughout the year and prices rose steadily. It is of interest to note that although India reduced her purchase of Zanzibar cloves by two-thirds in 1958, she increased her purchase of Zanzibar copra by five times. The area under coconuts continues to expand in both islands

and the demand for coconut seedlings has increased. It is unfortunate that so much land which used to be under cloves and is still capable of producing other crops of high value is being planted with coconuts, a crop which, even with a firm market, requires little labour and produces a relatively low return per acre.

The year 1958 was also marked by the fact that political feelings were allowed to affect the relationship existing between and within agricultural communities, and in some instances political pressure was brought to bear on tenants, squatters and employees. Towards the end of the year this situation had fortunately somewhat improved.

With a very small clove crop in 1958, the average cultivator felt a shortage of ready cash during the latter part of the year, and at the same time he was short of home-grown rice. In consequence at the end of the year a great deal of hand cultivation of rice and other food crops was undertaken whenever conditions were favourable. On the other hand, because of the shortage of ready cash, the demand for hiring tractors for rice cultivation slumped badly.

2. Weather

The annual report for 1957 noted that at many centres the rainfall was the highest for several years, while at Kizimbani a record 107 inches was received. By contrast, 1958 will be remembered as a year of unusually light rainfall. In general there was a shortfall of some 20 inches of rain and 30 wet days at most recording stations. This quantity constitutes about a third of the average total rainfall in Zanzibar island and a quarter to a third in Pemba. The effects of this shortfall were minimised by unusually good distribution.

In contrast to the two previous years, January and February were true dry season months with no more than $1\frac{1}{2}$ inches of rain. There were rains at the end of March followed by the true *masika* rains in mid-April. These were very much lighter than usual. It is customary to receive as much as 25 inches in the two months of April and May, but few places exceeded 15 inches in 1958. Fortunately the light rains continued in a very satisfactory manner well into June, which is usually a rather dry month. This was beneficial not only to the clove and coconut seedlings planted in the *masika* rains, but also enabled food planting to make good progress.

From July for a period of five months the rainfall was spasmodic. The *mchoo* rains of August and the adjacent weeks, which are relied on for the planting of pulses and other food crops, were barely distinguishable. October and November were very dry in the south of Zanzibar and also in Pemba. The *vuli* rains broke about a month later than usual, in the middle of December. Over most of the Protectorate they were rather light.

Rainfall figures are given in Appendix V to this report.

3. Principal Crops

CLOVES.

Following the cessation of clove buying by the Clove Growers Association in December, 1957, the price for cloves on the local market dropped at once to Shs. 140/- per 100 lb. and then continued to decline throughout the first three months of the year until it reached Shs. 80/- per 100 lb. in April. Thereafter it rose steadily to Shs. 121/- at the end of June. In spite of the fall in prices, sales continued, though at a reduced rate. In the six months from January to June, 2,451 tons were brought forward, bringing the total crop for the seasonal year from July, 1957 to June, 1958 to 24,195 tons, of which 20,744 tons or 86 per cent. was the produce of Pemba. This was the largest crop ever recorded. The crop in Pemba was a record for that island, while that in Zanzibar was the highest for 14 years.

On 1st August, the Clove Growers Association resumed the operation of a guaranteed minimum buying price at Shs. 110/- per 100 lb. for fair quality cloves in Zanzibar, with other prices ranging from Shs. 90/- to Shs. 115/-. The local market price fell from the June peak to an average of Shs. 118/26 in July and Shs. 112/03 in August, when the Association's floor price became operative. Following a slight rise at the end of August there was a steady fall thereafter to Shs. 110/74 in November. With no immediate shipments in view, the market was dull in November and December, and the Clove Growers Association was in consequence required to purchase most of the cloves offered at this time.

The 1958 *mwaka* crop was bright and of good quality. It did not arrive in quantity until September but, as usual, the first lots marketed were mixed with old cloves. A small *vuli* crop was picked in the north of Pemba and in Zanzibar; this began to arrive in November continuing into the new year. Total arrivals from July to December inclusive amounted to 4,720 tons or 302,071 frasila,* of which 4,061 tons came from Pemba.

Clove exports during the calendar year amounted to 9,102 tons, compared with 11,793 tons in 1957 and 12,044 tons in 1956. The reduction was principally due to the enforcement of India's policy of restriction of imports, in particular by the withdrawal of the arrangement allowing permit-free imports by country vessels. These vessels had carried some 1,410 tons in 1957. Compared with 1957 India's imports during 1958 were reduced by two-thirds or by 2,364 tons. Exports to Indonesia were reduced by some 1,225 tons, or by about one-fifth. Of the total clove exports for the year, 57 per cent went to Indonesia, 14 per cent to India, 11 per cent to Singapore and 5 per cent to the United Kingdom and the Continent. Some 40 countries, including the United States, shared the rest of the exports. It is worthy of note that small consuming countries increased their purchases of Zanzibar cloves during the year by some 400 tons.

The proportion of their export consignments which exporters were required, by law, to purchase from the Clove Growers Association, remained at 50 per cent throughout the year. The Association's selling price for Grade II cloves remained at Shs. 255/- per 100 lb. throughout the year. Export duty on cloves also remained unchanged at Shs. 60/- per 100 lb.

* A frasila is 35 lb. in Zanzibar. Clove crops are commonly estimated in lakhs of frasila.

The Clove Growers Association continued to be the sole buyer of clove stems, and this activity was not affected when the Association stopped buying cloves in December, 1957. The bumper clove crop inevitably resulted in unusually large quantities of stems being offered to the Association and by the end of the 1957/58 season a total of 4,411 tons had been purchased, as compared with 1,286 tons for the previous season. The price paid by the Association during this period was Shs. 16/50 per 100 lb. for stems of commercial quality. In the first six months of the 1958/59 season, 1,291 tons of stems were purchased, commercial quality at Shs. 15/- and inferior quality at Shs. 9/50 per 100 lb. Exports of clove stem oil during the calendar year amounted to 91½ tons of which 53 per cent went to the United States, 41 per cent to the United Kingdom and 6 per cent to continental Europe. The total shows an increase of 11½ tons on that of the previous year, due to increased imports by the United States.

COCONUTS.

The second half of 1957 saw a strong demand for labour for harvesting the bumper clove crop. In consequence there was little labour available for coconut gathering and copra production with the result that the fourth coconut gathering of the year did not take place on a large number of plantations.

This circumstance resulted in heavy arrivals of copra during the first quarter of 1958. At the same time the market was stimulated by a strong demand from India for copra and from the United Kingdom and Germany for coconuts. The market for oil meanwhile remained steady, but with the rise in the price of coconuts and copra oil millers experienced increasing difficulty in operating at a profit.

Exports of coconut products for the year are shown in the following table, where they are also compared, as copra equivalent, with those of previous years.

		<i>Copra equivalent</i>		
		<i>1958</i>		<i>Average</i>
		<i>Exports</i>	<i>1958</i>	<i>1954-56</i>
		<i>tons</i>	<i>tons</i>	<i>tons</i>
Copra	10,103	10,103	2,137	5,934
Coconut oil	3,334	5,557	7,388	6,280
Soap	2	2	1	3
Copra cake	2,892	—	—	—
Coir fibre	2,425	—	—	—
Coconuts	*9.04	1,291	347	232
TOTAL		16,953	9,873	12,443

*Millions of coconuts.

It will be seen from the above table that copra exports fell from an average figure of about 6,000 tons to just over 2,000 tons in 1957. This was due partly to delays in the harvesting of nuts and partly to the fact that copra exporters received greater competition in the copra market from oil millers. In 1958, with a production carry-over and a buoyant market, copra exports were the largest since 1944. Exports of whole coconuts also

increased very considerably and reached the equivalent of more than 1,200 tons of copra. Oil exports declined in 1958, but not to an extent comparable to the rise in the other two commodities. Considering the total copra equivalent it will be seen that after allowing for a carry-over of about 2,500 tons from the 1957 crop into 1958 the exports were some 2,000 tons above the average.

Average prices for unhusked coconuts on the heap rose from Shs. 100/- per 1,000 in January to Shs. 155/50 in the fourth quarter. This rise in average price, which was accompanied by a widening of the usual price range for quality and situation, was a reflection of a new demand from European markets for whole coconuts. Occasioned by a curtailment of normal exports from Ceylon and stimulated by personal visits by United Kingdom buyers, the expanded business attracted a certain amount of speculative but unskilled trading in the product. This led to spoiled and rejected shipments with consequent claims, but by the end of the year the trade appeared to have stabilised itself. In all, some 9 million nuts were exported as compared with $2\frac{1}{4}$ million in 1957. About $6\frac{3}{4}$ millions went to the United Kingdom and the Continent, $1\frac{1}{4}$ millions to the Middle East and $\frac{3}{4}$ million to South Africa.

Local market prices for copra rose steadily from an average of Shs. 41/43 per 100 lb. in January to Shs. 43/58 in March, Shs. 48/57 in June, Shs. 55/71 in September and Shs. 61/43 in December. Of the total of 10,103 tons exported, 9,371 tons were shipped to India, 300 tons to Europe, 300 tons to Palestine and the remainder to East Africa. Coconut oil exports declined from 4,432 tons in 1957 to 3,333 tons in 1958. As in previous years, over 80 per cent went to East Africa, the remainder being taken by Somalia, Madagascar, Europe, Arabia and South Africa.

The production of coir fibre by the dry unretted process continues to increase, and the product is winning recognition on overseas markets. In 1958 a total of 2,400 tons was exported as compared with 1,499 tons in 1957.

4. Subsidiary Export Crops

The local market price for chillies remained steady at from Shs. 100/- to Shs. 120/- per 100 lb. throughout the year. This price is relatively unattractive to growers, particularly when they remember that prices reached Shs. 250/- per 100 lb. in 1955. Production has consequently declined and a total of $44\frac{1}{2}$ tons only was exported during the year, compared with 71 tons in 1957. The United Kingdom took more than half the total; the rest (in descending order of quantity) was distributed between Australia, Canada, New Zealand, Iraq, South Africa and the Lebanon.

The only tobacco exported was 1,440 lb. of coil tobacco sent to Somalia in one consignment in April.

Four consignments of dried derris root, totalling 6,278 lb. weight, were shipped to Australia. The bulk of this was the produce of the Department's farms, and it is now clear that little support can be expected from the public in regard to this crop.

The year 1958 was a poor one for citrus generally, and the lime industry passed through an unfortunate period. The withertip disease of limes was particularly prevalent and virulent at the time of the main flowering, and most of the crop was lost. With most of the limes planted under the Citrus Scheme not yet in production, a large proportion of the available crop was utilised to satisfy the demands of the local market. These demands were enhanced by a shortage of rough lemons, and prices were high. In consequence the Clove Growers Association was able to buy only small quantities from the general public at the Association's price of cents 20 per lb., and had to rely largely on supplies from the Department. In all, the Association purchased $11\frac{3}{4}$ tons of which $9\frac{3}{4}$ were supplied by the Department. Production amounted to 81 lb. of lime oil and 425 gallons of racked juice. The latter was sold as raw juice (796 bottles) or processed to give cordial (2,450 bottles) or syrup (268 bottles). Sixty pounds of oil and 112 gallons of racked juice were exported.

5. Food Crop Production

The rice crop of 1958 provided a marked contrast to that of the previous year, when a large acreage was planted in both islands and yields were good. In 1958 the acreage actually planted was much reduced, and although fair yields were obtained from those plots which reached harvest, an unusually high proportion of fields were abandoned by their owners in the course of their growth.

This situation occurred particularly in Zanzibar, where, after a very late start, regular growers attempted to plant up their normal acreage. It was unfortunate that these late plantings, which might well have been successful in a favourable year, were followed by very dry weather and germination was delayed. When the *masika* rains began there was very little rice over 6 inches in height and much of the seed planted had not germinated. The normal period for weeding was therefore lost and the crop was rapidly smothered by weeds. In these circumstances growers who were unable to hire labour could do little except abandon a proportion of their plots. It is possible that 30 per cent. of the land sown to rice in Zanzibar island was lost either for this reason or because of poor subsequent development of the crop.

It is estimated that in Zanzibar no more than 2,933 acres of rice came to harvest. This is the lowest figure recently recorded and is slightly less than that for 1952. In Pemba the acreage recorded shortly before harvest was 7,027, which was also the lowest for many years. It is estimated that in the Protectorate as a whole some 7,000 tons of dry paddy or 4,200 tons of clean rice were obtained.

Essentially, the cause of both the reduced acreage and the late planting was the very large clove crop of 1957. A proportion of Zanzibar cultivators do not grow rice when they have an abundance of money from clove harvesting and, for this reason alone, especially in the absence of compulsory planting orders, the acreages would be expected to be low. As the clove harvest continued into December many clove pickers who intended to plant rice were late in doing so.

When it became evident that the rice crop would be small, growers turned their attention actively to the production of root crops. With favourable weather in May and June planting of cassava and sweet potatoes made rapid progress. Food crop planting was further encouraged in the second half of the year by the existence of a small clove crop and little demand for clove pickers. In much of Pemba, however, and in the south of Zanzibar the period from September to November was too dry for the planting of root crops.

Foodstuffs in general were in adequate supply in the local markets in both islands, Pemba being unusually well supplied with items other than rice owing to the negligible number of immigrant clove pickers coming to the island for the clove harvest.

6. Animal Husbandry

There was no radical change in the systems of cattle management during the year. The peasant cattle owner in general continued either to allow his cattle to graze unattended through bush-land where this was possible, or tethered his animals wherever they could obtain green food. Swamps, clove plantations, harvested rice fields and convenient patches amongst other crops were all used, as they have been for very many years. The system of tethering, although sometimes causing hardship to animals by limiting the amount of food they can obtain, is both convenient and economical. Moreover it makes use of small patches of grazing which would otherwise be wasted. The animals become docile through regular handling and in consequence are easy to deal with when sick or being sprayed and they receive more frequent attention in de-ticking than do the range animals. A few cattle owners may cut green food for their tethered stock, but this is not usual. Little or no other supplementary feeding is given except by about fourteen relatively large commercial dairymen who keep grade Friesian, Ayrshire and Guernsey type cattle in the neighbourhood of Zanzibar town.

About eight of these dairymen owning about 550 grade cattle operate with Government assistance in buildings, land and services. The cows and bulls which make up these herds are usually imported from Kenya, and the herds are grazed on rather sparse pasture under coconut palms. They consequently require considerable quantities of supplementary food. Cassava, groundnut and simsim cake are used regularly and coconut cake occasionally. Freshly cut grass is carted in to the animals daily. Under such conditions, however, where food is in rather short supply and the town demand for milk is unsatisfied, the calves born receive poor treatment and very little attention, and rarely reach a standard good enough for them to be absorbed into the herd.

All these dairy animals are dipped. Elsewhere in the Protectorate dipping is not accepted, except at one centre in Pemba. Spraying, on the other hand, is becoming increasingly popular, both in Pemba and Zanzibar. It is undertaken by the department without charge to the cattle owner, who is merely required to bring his cattle to convenient centres near grazing areas or villages.

In some parts of Pemba cattle are tethered on land which is intended for rice, for the sake of the manure which they drop, and a rice cultivator may pay a cattle owner for this service. In general, however, there is little integration of stock and crops and much manure goes to waste.

There has been no cattle census since 1948, and estimates of population are only approximate. It is believed, however, that there are between 25,000 and 28,000 cattle in Pemba and between 12,000 and 15,000 in Zanzibar. Pemba thus has about one beast to every six acres and is nearly self-supporting in meat but not in milk. Both commodities would be consumed in greater quantities if they were more easily available. In Zanzibar, where there is one animal to about 32 acres, there is a greater shortfall of both meat and milk.

Milk is imported in condensed or powder form and in recent years annual imports have exceeded £80,000 in value, while over £50,000 is spent on imported ghee. It is estimated that it would only require about 2,000 more cows of the standard now attained at Kizimbani to satisfy the import requirement of milk and a further 2,500 to replace the ghee imports. About 4,400 cattle are imported annually for slaughter. Although there is room for very considerable improvement, full self-sufficiency in beef is hardly to be expected for this would require the cattle population to be increased by some 25,000 additional animals.

The number of animals imported in 1958 was less than in the previous year when the affluence of clove pickers, including many from the mainland, increased the demand for meat. The following table shows the number of animals imported for slaughter in 1958 and previous years:—

				1958	1957	1956	1955	1954
Cattle	..	..	..	3,148	4,026	5,012	4,066	4,784
Goats	..	..	..	10,932	10,625	12,339	11,964	14,889
Sheep	..	..	..	1,198	1,208	1,319	1,442	2,150

Of the 1958 imports, 72 per cent of the cattle, 58 per cent of the goats and 86 per cent of the sheep came from Tanganyika, and the remainder from Somalia. These figures show rather higher proportions from Somalia than in 1957.

There was some reduction in the number of cattle slaughtered for meat in Zanzibar town, but the numbers of goats and sheep showed little change. In Pemba, where consumption of meat is more strongly influenced by the size of the clove crop, there was a considerable fall in the number of cattle slaughtered. The following table gives details for both islands:—

Zanzibar Town Abattoir

			Oxen	Cows	Calves	Goats	Sheep
Local stock	..	..	349	255	235	2,485	—
Imported stock	..	..	2,733	13	2	9,846	1,603
		TOTAL	3,082	268	237	12,331	1,603
1957 Total	..	..	3,751	358	286	11,865	1,693
1956 Total	..	..	4,203	221	195	14,383	1,538

Pemba Townships and Rural Areas

			<i>Cattle</i>	<i>Goats</i>	<i>Sheep</i>
Local stock	..	..	2,642	556	—
Imported stock	..	..	346	464	29
TOTAL	..	..	2,988	1,020	29
1957 Total	..	..	4,507	1,097	58
1956 Total	..	..	3,088	1,474	68

The preparation of hides and skins at the Government drying shed in Zanzibar continued and the following numbers were dealt with during the year:—

			<i>Hides</i>	<i>Skins</i>
From abattoir	..	..	3,581	13,844
From rural areas	..	..	379	2,394
TOTAL	..	..	3,960	16,238
1957 Total	..	..	4,798	16,656
1956 Total	..	..	5,002	18,367

In Pemba the preparation of hides and skins was in the hands of butchers and no figures are available. The majority of the hides of animals slaughtered in the Pemba townships as well as all those from Zanzibar town abattoir, were suspension-dried in the shade. Elsewhere, salt dried hides are frequently prepared which, together with other hides and skins prepared away from departmental supervision, are the cause of unfavourable reports from the mainland inspectorate.

Foot-and-mouth disease appeared in August in dairy herds about four miles from Zanzibar town. Although the symptoms were severe when the outbreak was first detected, affected animals showing ruptured vesicles in the mouth and feet, the virulence of the disease quickly subsided and animals later attacked were much less affected. Non-movement of stock and other precautions were put into effect without bringing legal powers into operation, and within two months the disease was no longer evident. No deaths occurred directly attributable to foot-and-mouth disease, but a number of cattle contracted redwater and east coast fever with fatal consequences; this was because it was inadvisable to take animals possibly infected to the dip during the voluntary quarantine period, and the spraying carried out was less effective.

Following the discovery of lumpy skin disease of cattle in Kenya, this disease was scheduled under the Animal Diseases Decree, and the importation of cattle from Kenya was prohibited as from 21st January. This inevitably caused disruption of the supplies of grade milk cattle required by Zanzibar dairymen, who usually purchase cows from the uplands of Kenya. Lumpy skin disease is believed to be caused by an insect-borne virus, and quarantine in Zanzibar would therefore appear to be valueless. While the effects of the various control measures taken in Kenya are being assessed and the disease is being further studied, the only safe course to adopt in Zanzibar is to prohibit importation from affected areas or to allow entry only through an overseas quarantine.

SECTION B.—THE WORK OF THE DEPARTMENT**1. Staff**

There were few changes in staff during the year and postings were infrequent. With one vacancy in the cadre of agricultural officers and one in that of assistant agricultural officers, the department was almost at its full complement.

A list of senior staff is shown at the cover of this report. The Director, Mr. A. K. Briant, O.B.E., was in charge of the department throughout the year. The Senior Agricultural Officer took vacation leave during which he attended a conference and a course. Mr. J. V. Webdale, Agricultural Officer, acted in his absence. Messrs. Buckler and Walker were in charge of Zanzibar and Pemba districts respectively, and the former spent a short time in Tanganyika studying tobacco production. Mr. Bowden was in charge of Kizimbani farm and Mr. Said Hamed of the Fruit Scheme. Mr. G. H. Coles arrived on first appointment to replace Mr. A. C. E. Callan, M.B.E., Inspector of Produce, who retired early in 1958. Officers in charge of other sections of the department remained unchanged. Mr. Othman Shariff was in charge of artificial insemination work which was started at the beginning of the year. Mr. L. Stevens left on the completion of his contract and the termination of his work in August.

Mr. M. A. Ghassany, Assistant Agricultural Officer, took sabbatical leave in the United Kingdom and spent one month studying Young Farmers' Clubs. He attended a nutrition conference at Makerere College earlier in the year. Two junior members of the staff returned from studies in the United Kingdom. A Kizimbani student was awarded a scholarship to the United Kingdom for a two-year course arranged by the Forestry Commission. A member of the department continued his studies in chemistry in the United Kingdom.

In the absence of the substantive chairman, the Director acted as Chairman of the Clove Growers' Association Board of Management. He was also Chairman of the Clove Growers' Association Advisory Committee, the Copra Board, and the Agricultural Advisory Committees. The two District Agricultural Officers were members of the Land Alienation Boards, which met frequently, the District Teams and the Road Boards.

Mr. L. Paul, Office Superintendent, retired from Government Service at the end of the year. He had served in the Department of Agriculture for nearly 28 years, with a short period of secondment to the Economic Control Board during the war. His single-minded devotion to his work and his attention to the needs of the department and its officers won for him the esteem and regard of all its members.

It is with the deepest regret that I have to report the untimely death of Mr. I. G. C. Squire on 25th September in the United Kingdom. Guy Squire had retired only a few months previously, after having served in the department for 26 years, following three years service in Sierra Leone. As Manager of Plantations and in other posts he performed his work with a strong sense of duty and with most conscientious thoroughness.

It is a pleasure to record that two members of the department were appointed by His Highness the Sultan to be Members of the Order of the Brilliant Star. Mr. G. E. Tidbury, Senior Agricultural Officer, who had recently left Zanzibar on retirement, was appointed a Member of the Third Class and Sheikh Omar bin Issa, Field Assistant, was appointed a Member of the Fifth Class.

2. The Development Programme

The Second Development Programme, which covers the period 1955 to 1959, continued without substantial change in the current schemes, but it was enlarged by the addition of a research project designed to investigate and seek control of withertip disease of limes. This is being financed with allocations made half from Protectorate and half from Colonial Development and Welfare funds. The other items of the Development Programme previously established are General Crop Development, the Citrus Fruit Industry, Rice Cultivation (Mechanical Cultivation), Insect Research (*Pseudotheraptus* on coconuts), the Experimental Control of Clove Diseases ("Sudden Death" and "Slow Decline"), Stock Husbandry (including the dairy and ranch herds), Fisheries Development, Forestry Development and Agricultural Training (village extension work). The programme of work under General Crop Development in particular and to a lesser extent under some of the other projects is closely interwoven with the general experimental and extension work of the department. Development activities are described in part in the earlier sections on cloves and coconuts but particularly in sections 3 to 8 which follow.

3. Crop Husbandry

BANANAS.

The department is increasingly making use of bananas as a nurse crop for tree seedlings such as cloves and cocoa. This is particularly successful where soil moisture is adequate for the bananas but surface drying through exposure is intense. The tall variety *Kijakazi* is usually used. It provides excellent shade and shelter but its fruits are of rather low quality.

At Kizimbani a collection of 28 varieties of local bananas is maintained.

A manurial trial on bananas was laid down during the year. The treatments include the use of farmyard manure, artificial fertilizers and a mulch of coir fibre dust. Striking growth responses, particularly to farmyard manure, were apparent before the end of the year.

CASSAVA.

Since 1950, when the first selection of 22 virus resistant cassava crosses were obtained from Amani, testing and bulking has continued with the original batch and with varieties received in 1953 and 1956. Of the 1950 group, the variety 46106/27, which is derived from a cross between cassava and tree cassava, is considered to be the best and is now in use by numerous cultivators. The variety T.206 is establishing a good reputation

on the *kinongo* soil in the south of Zanzibar. By selection against a local variety, the 16 varieties received in 1953 and 1956 have been reduced to 8. One of these shows exceptional promise.

Almost all the experimental work on cassava undertaken so far has been based on a growth period of about 12 months. This is the standard period in Zanzibar, where the public does not care for large coarse roots. For purposes of stock food, however, it may well be economically advantageous to leave the plants longer in the ground in order to get the maximum yield in relation to planting and establishment expenses. This is being investigated in trials with the variety 46106/27, where growth periods of 12, 15, 18, 21 and 24 months are being tested. Spacing and manurial treatments are also being investigated, separately and in combination with each other and with time of harvesting.

CHILLIES.

Nurseries were maintained in both Zanzibar and Pemba from which chillie seedlings were made available to the public without charge. In Pemba the response was once again negligible and this service will now be closed down there. In Zanzibar island interest in the crop survives in the coral areas of the south. A total of 190,000 seedlings were issued as compared with 161,000 in 1957 and 508,000 in 1956.

Chillies planted in the demonstration rotation at Kizimbani in March, 1957, completed their productive life and were uprooted in September, 1958, after yielding 1,411 lb. dried chillies to the acre. This is equivalent to a gross return of Shs. 1,128/- per acre per annum.

In response to market demands for a potent chillie, the department has been seeking to supply seedlings of the *kichaa* type at the nurseries. This has a particularly small fruit, which is firmly attached to the fruit stalk. Growers find that the labour involved in harvesting it is greater than with the other common local type, both because there are more fruits to the pound and because the fruits are more firmly attached. On the other hand there is less loss through shedding, and the price should be higher.

CITRUS.

The Citrus Fruit Industry Scheme of the Development Plan, reached its final (sixth) year for the payment of bonuses. These were paid annually in respect of limes, oranges, grapefruit or mandarins planted under the scheme which have been properly maintained. The maintenance of the citrus groves in 1958 was on the whole better than in 1957. With a poor clove crop, there was little difficulty in obtaining adequate labour except in the first quarter of the year.

The first quarter of the year and the months of September and October were very dry, and there were many outbreaks of fire in uncultivated areas. Spreading to plantations, these fires caused a loss of 20 acres of citrus, including $11\frac{1}{2}$ acres of limes, $6\frac{1}{2}$ of oranges and 2 of grapefruit, all of which were planted under the scheme.

In order to avoid fires of this nature, citrus growers are now being advised to interplant their citrus with ground crops if they are not otherwise able to keep them free of weeds. Over 50 growers have followed this advice and have planted cassava, sweet potatoes, maize, pineapples and ground nuts. While cassava and maize would not normally be recommended because of the fertility they remove from the soil, fire and weed competition are considered to be far more damaging to the crop.

Planting of citrus under the development scheme ceased in 1955, but the Clove Growers Association made funds available for the production and free issue of budded lime plants in 1956, 1957 and again in 1958. In this year, 3,600 plants were issued to 35 farmers. In the earliest plantings under the scheme the emphasis was on bringing into production areas which were unsuitable for clove cultivation but had shown themselves capable of supporting good citrus. Of varying depth, the soils usually overlay coral and the plots were often near to the uncultivated plains known as *nyanda*. Substantial numbers of plants were given to individual growers, and the average acreage planted in the first year was 4.3 acres per person. With the 1958 issue of plants the emphasis was changed. A higher proportion of plots in the clove areas were accepted while individual issues of plants were smaller in size. Thus the average acreage per person in respect of the 1958 issues was 1.0 acres only. Of the 50 acres established with Clove Growers Association funds, slightly more than half were in clove areas, whereas of the 309 acres previously planted not more than 6 per cent were so situated. While this does not further the policy of bringing the less productive land of the Protectorate into production it does ensure that a relatively high proportion of the plants will survive.

Excessive rains in November, 1957, resulted in lime trees being very severely attacked by withertip disease and this resulted in the setting of very little fruit. Rough lemons also failed to produce a normal crop, and as a result the demand for limes on the local market was greatly enhanced, and prices for both fruits rose to high levels.

At the department's pilot plots at Dole, near Kizimbani, the main flowering in November, 1957, was almost completely destroyed by withertip disease. Subsequent small flowerings in January and February and again during the *masika* rains were more successful. Nevertheless, the total crop was disappointing, reaching 9.87 tons only as compared with 23½ tons in 1957. An average of 99 fruits per tree was obtained whereas in 1957 there were 260. The harvest was widely spread throughout the year, with the main crop from April to August and a second small peak in November. The following table shows the proportion harvested in each month:—

	Months											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec
Per cent. of total . .	3	3	5	13	11	11	15	16	7	4	10	1

Investigations into the withertip problem commenced in March following the appointment in January of a plant pathologist from the Colonial Pool. In laboratory studies he cultured the organism and con-

firmed that it was *Gloeosporium limetticola*. Field studies were directed towards control of the organism by spraying with fungicides, and also towards elucidation of the relation, if any, between disease incidence and the fertility status of the soil. Various fungicides were effective in reducing infection to low levels if applied at the right time and at sufficiently short intervals. In a manurial trial on a nitrogen-deficient soil, application of nitrogen significantly reduced disease incidence.

Elsewhere in Zanzibar, observations were made on the effects of manures and mulches on mature lime trees. In one instance a mulch of compost and banana stems applied in August to limes growing on potash-deficient *kinongo* soil produced a striking vegetative response followed in March by a heavy flowering whereas untreated trees bore no crop.

In Pemba, lime seedlings and a few budded plants were made available from general development funds and 190 plants were issued. Greater interest was shown in budded oranges, 927 being sold there at Shs. 2/- each. At Kizimbani, 1,326 budded oranges were sold, as well as small numbers of grapefruit, lime and mandarin.

CLOVES.

Some 532,600 clove seedlings were produced for issue in Zanzibar and Pemba in 1958, slightly more than in 1957. But for the first time for a number of years a considerable number were left in the nurseries in both islands, being surplus to requirements. This may in part have been due to the operation over the past two years of a system of distribution which has tended to convince growers that it is not always necessary to ask for far more seedlings than are required. But it is probable that in Pemba the principal cause was the psychological effect of the Clove Growers Association's action in stopping its clove buying activities at the end of 1957. A depression of spirit resulted in much hesitation and delay in applying for seedlings, while some growers considered seriously the possibility of planting alternative crops; coffee was in particular demand. At the end of the season there were still over 30,000 seedlings left in the Pemba nurseries and 15,000 in Zanzibar. Pemba planted over 43,000 less than in 1957, but Zanzibar planted more, so that the total issued in the two islands was slightly more than in 1957 as shown in the following table:—

			<i>Free</i>	<i>Sold</i>	<i>Total</i>
Pemba	..	..	126,069	67,858	194,247
Zanzibar	..	..	146,287	141,837	288,124
TOTAL			272,356	209,695	482,371
1957 Total	..	..	296,303	184,657	480,960
1956 Total	..	..	137,460	307,587	445,047
1955 Total	..	..	105,895	279,049	384,944

The free seedlings referred to in the preceding table are those which were produced by the department with funds provided by the Clove Growers' Association, which does not normally charge for seedlings or other planting materials. The seedlings sold were produced with funds provided by Government and were sold at 10 cents each. Costs of production were approximately 52 cents per seedling in Pemba and 35 cents in Zanzibar.

For 1959 seedling distribution a slight reduction in numbers has been made, while nurseries that have been prepared for 1960 distribution are on a considerably reduced scale. This reduction has been effected partly owing to the withdrawal of financial assistance by the Clove Growers Association, partly to the decrease in demand and partly to allow funds to be diverted for the production of planting materials for subsidiary crops.

In Zanzibar the privately-owned clove plots which are pruned regularly as a demonstration of the control of "dieback" disease were treated as required and kept in good order. In response to demand the number of such demonstration plots in Zanzibar, including one Government plot, was increased to 18. Two plantation owners employed trained gangs to undertake "dieback" pruning on their trees.

In Pemba the picture is very different. Three years ago over 20 plots were being treated, with the full approval and co-operation of the owners. In 1958, only one of the owners, an employee of the department, was prepared to allow the work to continue. In a few cases the owners appear genuinely to think that the method is not advantageous. In many other cases, however, those closely concerned with the work came to the conclusion that in refusing permission for pruning to continue the owners were following the advice of their political association.

The same type of obstruction by this political group was offered in respect of plots of cloves which were being sought as sites for "sudden death" experiments in Pemba. Two useful plots belonging to individual landowners were lost for this reason. Finally two reasonably satisfactory sites belonging to co-operative landowners were obtained. This brought the number of sites obtained to a total of four and it was found possible to include on these sites the 24 treatment plots required for the experiment.

Treatments in this experiment involve attempts to isolate and remove foci of infection by trenching and liming coupled with the removal of dead clove trees. The removal of the stumps has been facilitated by the use of an explosive, which has cut the cost considerably. It is too early to gauge the effectiveness of the treatments in stopping the spread of the disease.

The four centres in Zanzibar where the effect of certain ground treatments in the prevention of "slow decline" of cloves is being tested were maintained in good order.

Experiments now being conducted on cloves at Kizimbani include a manurial trial, a trial with two types of mulch, the use of hormones in flower production, a spacing trial and a comparison of the value of different varieties of bananas as a nurse crop. The 1958 hormone trial, which was in the nature of a preliminary observation, showed marked responses to alpha-naphthalene acetic acid. Applied in late December and January it affected the crop which was harvested in the following December, the bud initials having appeared in June, six months after the application of the hormone.

COCOA.

Past experience has shown that conditions in Zanzibar and Pemba generally are marginal for cocoa. Only in rather special circumstances will it grow really well. The essential requirements appear to be adequate moisture coupled with soil conditions which permit free drainage, and freedom from surface exposure. Young *forastero* cocoa trees are growing extremely well under sheltered conditions on a plateau of *utasi* soil at Matangatwani, Pemba, where annual rainfall averages 73 inches and serious rain failures are rare. In Zanzibar good growth of *forastero* has been obtained where the trees are within reach of the water table and of *criollo* in a moist sheltered valley on the slope of a hill under partially cleared natural forest.

To explore the possibilities further, seed of eleven Upper Amazon varieties and one Amelonado variety was obtained from the West African Cocoa Research Institute. These are all of the *forastero* type and believed to be relatively drought resistant. They will be tested at Kizimbani. Meanwhile search is being made in both islands for sites which have the required characteristics, so that demonstrational plots may be laid down with the local *forastero* type on private land.

Current experiments at Kizimbani, all of which involve *forastero* cocoa include spacing and manurial trials.

The department continued to harvest, ferment and prepare the cocoa of private growers in Zanzibar, free of charge. The 1957-58 crop, which was mostly *criollo*, amounted to 14,291 lb. It was sold through the Clove Growers Association on the London market. A slightly larger crop will be harvested in 1958-59.

COCONUTS.

Coconut seedlings were again produced on behalf of the Copra Board in both Zanzibar and Pemba. Costing about 49 cents to produce in Zanzibar and 66 cents in Pemba, they were sold for 10 cents each. Issues were as follows:—

			1958	1957	1956
Zanzibar	..	..	71,015	51,817	141,845
Pemba	..	..	34,956	34,893	42,075
TOTAL			105,971	86,710	183,920

The experiment in which 100 acres of coconut palms near Kizimbani are being sprayed to investigate the control of *Pseudotheraptus wayi* was continued. In this experiment the second year of spraying was completed towards the end of 1958, and a complete year's harvest of fully protected crop was gathered. Increased numbers of nuts have been obtained in response to the treatment and the average copra out-turn per nut was increased by 10 per cent. The Entomologist reports that the spacing of the coconut palms appears to influence the response in numbers of nuts that is obtained from spraying, and that the greatest response is obtained at the widest spacings. By normal standards, parts of the experimental area are too closely planted.

COFFEE.

Interest in coffee growing is gathering momentum, partly as a result of the encouragement given by the department and partly owing to the fall in clove prices. Nurseries of *liberica* coffee were maintained at Kizimbani and at clove nurseries in the districts. Two-thirds of the funds required were provided by the Clove Growers Association; in consequence applicants for seedlings were given two free seedlings for each one that was purchased at 30 cents. The numbers issued in 1958 and the two previous years are shown in the following table:—

			1958	1957	1956
Zanzibar	..	..	14,404	10,090	3,797
Pemba	..	..	10,415	5,231	5,032
TOTAL	..		<u>24,819</u>	<u>15,321</u>	<u>8,829</u>

Experiments on coffee at Kizimbani include a manurial trial, a pruning trial and a variety trial including *liberica*, *excelsa* and *robusta* coffees. The manurial trial on *liberica* coffee has consistently shown the enormous increase in yield which can be obtained by mulching. A sample of *liberica* coffee was sent to London for appraisal and a report is awaited.

COTTON.

Two varieties of jassid-resistant cotton, UK 51 and UK 55 were tested at Makunduchi in the south of Zanzibar. Planted in April, it received well-distributed rain in April, May and June followed by dry weather in July, August and September. The plants grew well, flowered in June and were picked in September. Yields of seed cotton were 810 lb. per acre for UK 51 and 730 lb. for UK 55.

DERRIS.

Although nurseries for the supply of free planting material of derris were maintained in both islands, and good yields at Kizimbani and elsewhere have been publicised from time to time, public interest in the crop has practically ceased. Issues of planting material were negligible, and the maintenance of special nurseries for the public seems no longer to be generally justified. Should material be unexpectedly required it could be obtained at the nurseries maintained for departmental planting.

This apathy towards a crop which on the department's farms has given up to 100 per cent. profit on outlay may perhaps be ascribed to a satisfaction with the economic returns obtained from the standard cash crops together with a distrust of a new crop whose successful cultivation may require the acquisition of new skills. A number of growers gave up after only one attempt on finding that a high proportion of their cuttings died after planting out. Such losses have occurred in departmental plantings when they were made at the wrong time. But that rarely happens where experience has been gained. Most of the failures in private plantations have occurred either through too late planting, when there was little hope of continued rain, or lack of attention to weeding during the first 12 months of growth.

So long as a market remains, the department will no doubt continue to plant derris as a part of the productive rotation on its farms, for it is giving net returns of Shs. 600/- per acre per annum or Shs. 1,000/- per crop. There is also cause for hope in the performance of an energetic and enterprising co-operative society in Zanzibar which harvested half an acre of derris in 1958 obtaining 416 lb. of dried root on which a first advance of Shs. 500/- was paid by the Clove Growers Association. The Society is not dissatisfied with the result and it proposes to try again.

From experiments conducted at Kizimbani it is almost certain that the greatest return in relation to time is obtained if the plants are harvested at 18 months, the weight increment after this point decreasing with time. Tests of the rotenone content, on which prices are based, have also indicated the probable advantages of harvesting at this time, though they are still subject to confirmation by more recent experiments which are not yet concluded. Recently, extremely high rotenone contents have been obtained in a fertilizer trial, which pose a number of questions.

MAIZE.

Yellow maize is an important constituent of the diet of the farmers living in the coral areas particularly in the south of Zanzibar island. The longer-term white maize is grown extensively by immigrants from the African mainland in the wetter areas to the west of both islands. Both types have been the subject of investigation during 1958.

At Makunduchi the local yellow maize was compared with three varieties from the mainland which had been bred for resistance to the rust *Puccinia polysora*. In the absence of rust attack the varieties could not be evaluated from this point of view but in the rather dry conditions experienced the local variety which was ready for harvesting at 88 days gave 888 lb. of grain per acre while the others, which were harvested at from 102 to 108 days' ranged from 372 lb. to 552 lb.

Stem borers sometimes cause serious loss of crop in the coral areas. In a trial at Makunduchi, 5 per cent. DDT dust was effective in reducing the damage. Weekly applications were more effective than applications made at fortnightly or 3 weekly intervals. In the untreated plots only 11 per cent of the plants showed no infestation while 70 per cent were badly damaged or destroyed. In the plots treated at weekly intervals, however, 47 per cent of the plants were unattacked and only 21 per cent were badly damaged or destroyed.

White maize is grown at Kizimbani for the grain and also for silage. One plot grown for silage produced 17 tons of green fodder per acre. Cultural experiments during 1958 were concerned with manuring and spacing. Highly significant responses were obtained to manuring, an application of farmyard manure at 10 tons per acre, with superphosphate at 2 cwt. per acre and sulphate of ammonia at 1 cwt. per acre producing an average yield increase of 2,052 lb. of dried grain per acre. In another trial application of 2 cwt. superphosphate and 1 cwt. sulphate of ammonia per acre at the time of planting also produced highly significant yield increases averaging 973 lb. of dry grain per acre. The results of other trials suggest that there is no advantage to be gained by placement of the

superphosphate compared with broadcast application, and that sulphate of ammonia may with equal advantage be applied to the seedbed at the time the superphosphate is applied instead of top-dressing at a later stage—thus greatly facilitating the whole operation and reducing costs by permitting the applications to be made together.

NEMATODES.

Dr. E. Whitehead of the East African Agriculture and Forestry Research Organisation paid a brief visit to Zanzibar to collect samples of nematodes. Numerous species were obtained, and he found that most of the principal crops—but not cloves—were affected. Of particular interest were a few specimens of *Belonolaimus* sp. which had not previously been recorded in East Africa.

NUTMEGS.

Increasing attention was paid to this crop during the year. The yield of four mature trees at Kizimbani was recorded, and was found to average $46\frac{1}{2}$ lb. or 4,553 nuts per tree, one tree producing as many as 8,320 nuts weighing 84 lb. There was an average of 98 nuts to the pound. A distillation of nuts in Zanzibar yielded 9 per cent oil, but a figure of 13.3 per cent was obtained from a sample distilled in New York.

Propagation by seed has been found to be slow and wasteful, and the seed soon loses its viability. Nutmeg trees are dioecious, and as the sex of seedlings cannot be determined until they come into bearing, wasteful over-planting is necessary in order to ensure that a high proportion of bearing (female) trees is established. Vegetative propagation is therefore being explored and although the tree does not respond readily to the usual methods, some success has been obtained and the work is continuing.

PINEAPPLES.

For the second year, a few growers in Pemba showed special interest in planting pineapples, in order to produce fruit for sale on the local market. To supply this unusual demand the department purchased some 14,820 suckers in Zanzibar and sent them to Pemba for resale at the original cost price without charging for labour and transport.

Experiments undertaken at Kizimbani were concerned with the effects of coir fibre dust mulch and of the growth-promoting substance alpha-naphthalene acetic acid. The latter, applied in a concentration of 2 c.c. A.N.A. per gallon of water at the rate of 2 fluid ounces per plant successfully induces fruiting. But the pineapple plant must be well-grown before application otherwise a very small pine will be produced. Applications at any time between January and the commencement of the rains all produced fruits during the rains. Applications during the rains were not so effective.

In the mulching experiment the pineapples were planted in late 1954 and finally uprooted in 1958. During 1956, 1957 and 1958 the yield from the untreated plots was equivalent to 2,836 fruits per acre, weighing 9,624 lb. From the plots mulched with coir fibre dust the yield was equivalent to 3,212 fruits per acre weighing 16,296 lb. Thus not only did the mulch increase the total number of fruits by 13 per cent but the

average weight of individual fruits was increased by 50 per cent from 3.39 lb. to 5.07 lb. At the local price of 10 cents per lb. the increase due to mulch was worth Shs. 166/30 per acre per annum, making it clearly economic.

In the drier and thinner soils of the Protectorate such as the *kinongo* at Mkwajuni it has been shown to be practically essential to use coir fibre dust or some other mulch if pineapples are to be grown satisfactorily.

RICE.

The department continued to encourage the use of fertilizers in accordance with the requirements of the different soil types as determined by experiments over a number of years. To bring home to the cultivators the economic advantages of recommended fertilizer applications, demonstration plots were laid down in the main rice areas of both islands. In the six Zanzibar demonstration plots of the 1957/58 season for which yields are available, the average yield of the unfertilized plots was 1,309 lb. paddy per acre, whereas the adjacent fertilized plots averaged 3,026 lb. per acre. The average increase of 1,717 lb. paddy may be valued at Shs. 536/-. The fertilizers would have cost Shs. 65/-. Superphosphate and sulphate of ammonia were sold to the public at cost price and to facilitate sales supplies were made available in the villages themselves. Some two tons were purchased in the 1957/58 season. It was unfortunate that the season turned out to be unusually dry, as this resulted, in many areas, in the response to fertilizers being less than it might otherwise have been. In the 1958/59 season money was generally scarce and growers could not be persuaded to trust their judgment sufficiently to buy more than about half a ton.

Variety trials at Kizimbani with varieties received from Trinidad in 1956 have demonstrated the good qualities of three varieties, namely Red American, Sughandi and D.52/37. These have all given higher yields than Mngazija, which is the highest yielding of the Zanzibar lowland varieties. For example, in wet conditions at Kizimbani, where Mngazija gave 2,015 lb. of paddy per acre—a quite fair yield—Red American gave 3,040 lb. These three varieties are now being demonstrated in 6 plots in the two main rice areas of Zanzibar island, planted alongside Moshi, a well-known and popular local variety.

During recent years selection of individual plants within the variety Mngazija has been carried on at Kizimbani. This work was based on original measurements made in 1955 when it was found that in that particular instance 57 per cent of the plants gave heads with 3 ozs. of paddy per plant, 33 per cent gave 4 ozs. of paddy per plant and 9 per cent gave 5 ozs. or more. Selection, bulking and culling has resulted in six chosen strains which were tested in 1958. The lowest yielder gave 2,066 lb. of paddy per acre and the highest 2,708 lb. which was significantly greater than three of the others. It is clear that there is room for improvement in the local varieties and that this could be effected by careful selection.

SWEET POTATOES.

In manurial trials at Kizimbani the value of farmyard manure, even at applications of not more than 5 tons per acre, was amply demonstrated. In one trial, FYM at 5 tons per acre gave a yield of 10,425 lb., the control giving 4,125 lb. The nett increase in value of the crop after deducting the cost of applying the manure was Shs. 290/- per acre. In another trial, 10 tons of farmyard manure per acre raised the yield from 1 ton 2 cwt. to 3 tons 15 cwt.

TOBACCO.

Trials with Virginia tobacco, which are being conducted in co-operation with the East African Tobacco Company, were continued for the second year. Of the original three varieties tested, Harrison's Special was selected for the 1958 work, and plots were laid down at Mkwajuni, Mangapwani and Uroa in Zanzibar island. Transplanting in July was shown to be preferable to transplanting in August or September. Leaf of satisfactory quality was produced and it has been decided to continue this work restricting it to the coral areas in the south of Zanzibar.

YAMS.

Yams are an important food crop in the *kinongo* soil areas in the south of Zanzibar and to a lesser degree in the north. At the department's demonstration stations in these two areas it has been customary for some years to demonstrate the value of compost in yam growing, resultant yields usually being at least doubled. In 1958 artificial fertilizers were used to supply the three main nutrients at Makunduchi, while fertilizers and coir fibre dust were tested at Mkwajuni in the north. The Makunduchi results showed that fertilizers are of little value on their own, at least in a relatively dry year. At Mkwajuni interesting results were obtained; the greatest yields were obtained with compost, the crop being nearly eight times that of the control, but coir fibre dust mixed with the soil into the planting hole, with a late top dressing of sulphate of ammonia, gave responses which were not far short of those from the compost. A complete NPK fertilizer dressing also gave a good response, but the coir dust alone showed yields which were only a little more than twice those of the control.

4. Mechanical Cultivation

During the year three new Fordson major tractors with Ransomes disc ploughs were purchased for the Rice Cultivation Scheme bringing the total to twelve tractors in Zanzibar and one in Pemba. Three additional disc tillers were also obtained. This expansion appeared to be fully justified in view of the difficulty that had been experienced in meeting the demands of rice growers during the 1957/58 season. The actual demands for tractors during the 1958/59 rice season, however, were much reduced, and they were at no time used to their full capacity.

The extent to which rice cultivators in Zanzibar make use of the mechanical cultivation facilities offered to them depends basically on their current financial position, but there are a number of interlocking factors

involved. At the start of the 1957/58 season the largest clove crop ever produced was being harvested. Pickers were in great demand and the rice farmers of Zanzibar and Pemba were fully occupied in this work. With money in their hands, those who grow rice only when necessity dictates were reluctant to interest themselves in the crop. After some delay, this attitude was counter-balanced, in so far as tractor cultivation was concerned, by the desire of the regular rice cultivators to continue picking cloves while having their rice land prepared at the proper time. They sent money back to their homes in Zanzibar and tractor cultivation went ahead very well. When the clove harvest came to an end in December, 1957, hand cultivation also progressed, but many rice growers who would normally employ paid labour to help them found that it was unavailable or too expensive. In these circumstances there was a strong demand for the tractors in the early weeks of 1958, and cultivation did not cease until the third week of March, a month later than usual. The total acreage ploughed during the season amounted to 1,173 acres as compared with 995 in the previous season. After-ploughing cultivations amounted to 500 acres as compared with 411. It is estimated that the acreage cultivated by tractor represented 30 per cent of the small total rice acreage planted in Zanzibar in 1957/58 as compared with 12 per cent of the much larger acreage planted in the previous season.

During the 1958/59 rice season the situation was entirely different. A very small clove crop and reduced wages for picking provided little surplus money for the hire of machinery. While the need for increased plantings of rice was generally accepted most growers had ample opportunity to undertake cultivation by hand themselves; moreover, hired hand labour was more freely available. In consequence, the acreage cultivated by tractor to the end of 1958 amounted in Zanzibar to 409 acres ploughed and 558 acres total cultivation only. These acreages are not likely to be increased by more than about 50 acres before the season ends.

The average size of plot ploughed, which had almost doubled to reach 1.21 acres in the 1957/58 season, fell slightly to 1.02 acres in the 1958/59 season. Similarly the average acreage per person fell from 1.25 to 1.07 acres. The number of people who employed the tractors on rice cultivation fell from 932 to approximately 420.

Contract rice drilling was undertaken for the first time using a borrowed standard 7-foot drill. Although planting may be considered to be the easiest operation in the whole rice-growing cycle, it seems that the larger growers at least may be very willing to hire the drill. Some 19 acres are expected to be drilled during the season. Drilling has been restricted to plots of not less than five acres in extent.

In Pemba, where rice land suitable for mechanical cultivation is more limited, the demand for tractor cultivation did not decline to the same degree as in Zanzibar. The single machine available for this work during the greater part of the season was kept fairly fully employed, and 52 acres were ploughed by the end of December, 1958, as compared with 86 acres for the same period in 1957 and with 117 acres for the 1957/58 season.

It is still the aim of the scheme to obtain as much work as possible between the rice seasons. In this there was no greater success in 1958

than in the two previous years, the acreage cultivated for crops other than rice in 1958 amounting to 313 only, as compared with 358 acres in 1957 and 486 acres in 1956. The greater part of the reduction over the two years has been in disc tilling and weedcutting in clove and coconut plantations, a type of work which has been particularly expensive because the plantations have usually been much neglected and damage to the tractors and implements was not uncommon. Some increase in acreage ploughed for crops such as maize was obtained.

A new development in 1958 was the use of a Ransome's toolbar to which could be fitted ridging or cultivating attachments. The spring tine cultivator successfully prepared land for drilling rice and was also successful in preparing uncultivated land for ridging, provided the cover consisted of nothing more than short grass or stubble. With slightly longer grass it was found preferable to use a disc-tiller for cutting up the vegetation before using the ridger. The answer to really long or tough vegetation has not been found but it may be necessary to use a slasher or roller-weedcutter and then burn. There is no doubt that under reasonable conditions the ridger will prepare ridges 5 feet wide and about 20 inches high acceptable to the growers for the planting of cassava, sweet potatoes or maize. There appear to be good prospects for this implement in 1959.

Detailed and full costings of the scheme were maintained, all items such as depreciation on buildings and machinery and staff salaries being included as well as running expenses. On this basis only one operation, ridging, was operated at a profit. Ploughing for rice cost Shs. 67/65 per acre during the last four months of the 1957/58 season and Shs. 73/54 during the first 3 months of the 1958/59 season. Plantation ploughing at other periods was very much more expensive costing over Shs. 200/- an acre. Disc-tilling cost Shs. 50/32 in the first rice period and Shs. 61/55 in the second, but over Shs. 100/- per acre on plantation work. These inflated costs for plantation cultivations are a reflection not only of the difficulties of the work but also of the small amount of employment obtained in each period. Charges for cultivation remained unchanged in 1958, operating on a graded scale according to acreage which gave average rates of about Shs. 50/- per acre for ploughing and Shs. 25/- for disc-tilling.

5. Stock Husbandry

STOCK IMPROVEMENT.

The breeding policy in the Kizimbani herd of dairy cattle remained the selection of animals both male and female for high milk production using the stock already available. The herd consists of animals of the local Zebu type on which a Boran type having good milking qualities has been increasingly imposed.

The criterion for selection of the females has been total milk yield alone, no regard having yet been paid to butter fat. The culling standard for the milking herd remained at 2,600 lb. in either of the first two lactations.

The old Boran bull, No. 399 "Ndurumo", was in use as a stud bull throughout the year and produced 19 calves by normal services. Two young bulls, including one purchased in 1956 from the farm where "Ndurumo" was bred, completed the initial services necessary for progeny testing while five younger animals commenced service.

Management of the herd remained largely unaltered but with an increase in the number of managed and fenced paddocks. The milking herd is gradually being confined more and more to the station instead of being grazed over poorer pasture which is also used by stock belonging to private persons. Apart from advantages of rest and plentiful water, the added control will no doubt reduce losses due to tickborne diseases. Once again East Coast Fever was the most serious disease and cause of mortality, two outbreaks occurring when the necessity of changing the dip fluid resulted in a break in the 5-day dipping routine.

Calves continued to be hand-reared on whole and skimmed milk or on nurse cows. Trials with milk substitutes were begun. A feature of the Kizimbani method in recent years has been individual penning of the young calves in moveable hutches. This has resulted in a high level of good health and freedom from disease. White scour occurred briefly in 1958 for the first time for several years but was quickly brought under control. Calf mortality during 1958 reversed the trend of the past five years, rising from 6.5 per cent. to 17.4 per cent. This figure is the number of calves under 12 months old which died in 1958 from all causes, expressed as a percentage of the total live births in 1958. It will be realised that this is not a direct relationship.

In recent years unwanted male calves have been sent, after weaning, to one of the beef ranches. It has been found that not only does it not pay to hand-rear calves on milk for eventual beef production but that hand reared animals sent to the ranches lose condition rapidly. During most of 1958 therefore, they were sold at birth.

Seventy-six lactations were completed in 1958 as compared with 99 in 1957 and 81 in the preceding year. The average milk yield in 305 days of these lactations fell slightly to 2,134 lb. The average monthly milk index in pounds per cow per day fell throughout the year, from 9.2 lb. to 6.7 lb. giving an average for the year of 7.9 lb. The figure has thus fallen twice from the level of 9.0 lb. achieved in 1955 and 1956, and the fall is largely due to the coming into milk of the progeny of several poor bulls which were under test.

Transferring the results obtained at Kizimbani into practical stock improvement in the field is somewhat difficult in view of the seriousness of the tick-borne diseases in both islands and the fact that practically no animals in the districts are dipped. The first attempt to overcome this difficulty was to permit young bulls from Kizimbani to become infected with east coast fever at a departmental outstation in Zanzibar, sending them to Pemba for stud service after they had acquired resistance by contracting the disease. This method, though wasteful, has had some success and six such animals at stud in Pemba performed 104 services during the year. After difficulty had been experienced in finding in Zanzibar a suitable site, carrying an adequate e.c.f. challenge, at which

to rear these young bulls under conditions of good care and management, it was decided to try sending calves to Pemba directly after weaning. Six calves were sent in 1956 but they all died from east coast fever. The method now being tried is to send calves to Pemba shortly after birth to be brought up on nurse cows. Two bull calves were sent in 1958. They have both contracted e.c.f., have survived and are growing well.

Rapid dissemination of good Kizimbani blood, however, needs other means than these. For this reason artificial insemination has been started with a view to providing a service not only for Zanzibar island but also Pemba. Using the electrical stimulation method, semen was collected in 1958 from five Kizimbani bulls, including "Ndurumo". After dilution it was possible to store sperms for a few days only by using an ordinary household electric refrigerator. From the end of January, Kizimbani cows and heifers were inseminated artificially, being returned to the bull if they did not take at the second attempt (later in the year, at the first attempt). There were 144 inseminations, of which 38 were repeats, and at the end of the year 44 animals or 41.5 per cent., were known to have conceived. This figure is lower than the normal for natural service at Kizimbani and resulted in a drop in the calving rate. Attempts to improve the results by modifying and improving the technique are in hand.

The insemination service was offered to cattle owners in Zanzibar, and after a hesitant start has now become established on a small scale. A total of 57 privately owned cattle were inseminated. Only five of these are reported to have returned, but it is of course recognised that any figures in relation to these animals are likely to be unreliable.

FODDER AND PASTURE IMPROVEMENT.

A policy of increased production through breeding, selection and stud services can only take effect in a context of adequate feeding. The milking herd at Kizimbani received cassava, coconut cake, maize meal and bran, and also green food—either silage or fresh-cut kudzu vine—when necessary. These foods and the methods of feeding them are demonstrated to cattle owners whenever visits are made to Kizimbani while kudzu and silage are also being produced and fed to cattle at the Makunduchi demonstration farm. The first step towards improvement in Makunduchi and similar areas must be to persuade cattle owners that their cattle need not inevitably become emaciated to the point of collapse during each dry season.

In the wetter areas much could be done towards improving pastures on the lines practised at Kizimbani where *Digitaria* provides productive pastures when managed properly. Under test at Kizimbani are *Digitaria smutsii*, *Cenchrus ciliaris* (3 strains), *Chloris gayana* (2 strains), and Batiki blue grass (*Ischaemum aristatum*). None of these at present show much prospect of being more productive than the local *Digitaria*. At the Tunguu ranch these grasses (except Batiki blue grass) are being tested with others including *Eragrostis curvula*, *Brachiaria brizantha*, *Cynodon plectostachyum* and *Setaria sphacelata*, as possible substitutes for the

dominant *Heteropogon contortus*, at least in the home paddocks where establishment may be assisted by watering. The majority of the species flowered and seeded well and produced substantial growth but they deteriorated when dry weather set in after they had been grazed.

Seed of *Urochloa pullulans* (from Kilosa) and *Bothriochloa insculpta* (from Kongwa) and planting material of *Digitaria decumbens* (from Entebbe) was received and planted. Seed of *Stenotaphrum dimidiatum* (Pemba grass) was supplied to Venezuela and seed of Batiki blue grass to Uganda.

STOCK RAISING (CATTLE RANCHES).

The two beef ranches of Hanyegwa Mchana and Tunguu are situated in that part of the country which suffered more than almost any other, except perhaps the extreme south, from the dry weather which occurred during the first two months of the year and again from July to December. At Tunguu grazing became so scarce that in November it was necessary to move a substantial number of the animals. A full survey at this time revealed that the ranch was 1,800 acres only in extent, instead of some 2,500 acres assumed. It was therefore decided to make the move permanent and a new ranch was started on Government land at Pangeni in the north of Zanzibar island with 150 bullocks from Tunguu. Pangeni is an area which is ecologically quite different from Hanyegwa Mchana or Tunguu. It is not *uwanda* but consists of parkland carrying mixed grasses such as *Panicum maximum*, *Digitaria* spp. *Hyparrhenia* spp. *Sorghum* spp. and others, but no *Heteropogon contortus*, which is dominant at the other two ranches. How it will react to clearing, grazing and perhaps firing remains to be seen. Since the move was made, temporary housing has been put up, a crush erected, a well dug and preparations begun for the installation of a windpump.

The number of cattle increased at both ranches, mainly by births. At the end of the year there were 617 animals at Hanyegwa Mchana and 772 at Tunguu (including Pangeni), compared with 520 and 649 respectively at the end of 1957. A total of 67 animals were sold of which 41 were fat bullocks and the remainder culls. The ranches suffered serious losses by the deaths of a number of the Kenya bulls, mostly through tick-borne diseases.

It was a good year for births. At Hanyegwa the calving percentage rose from 59.7 per cent. in 1957 (a low figure partly due to the absence of bulls for a period) to 87.4 per cent. At Tunguu it fell slightly to 73.5 per cent. The actual numbers of calves born were 145 and 161 respectively. They were all the progeny of Boran bulls and are turning out to be well-built, robust animals. Their average weight at birth was 37.5 lb. compared with 35.4 lb. for calves of local bulls born in the previous year. Calf mortality remained low at Hanyegwa (4.8 per cent.) and rose from the very low figure of 0.75 per cent. to 5.6 per cent. at Tunguu. Adult mortality with 15 deaths (2.8 per cent.) at Hanyegwa and 39 deaths (6.3 per cent.) at Tunguu did not greatly exceed that of 1957. But the deaths were more serious in that six out of the eleven Boran bulls from

Kenya died. As in 1957, tick-borne diseases were the main causes of mortality. Despite regular dipping at Hanyegwa and spraying at Tunguu, eight animals at Hanyegwa and twenty at Tunguu died of tick-borne diseases. These included five of the Boran bulls.

The use of antrycide pro-salt at Hanyegwa has very effectively reduced trypanosomiasis there to negligible proportions. At Tunguu, where the tsetse fly (*G. Austeni*) is more numerous, the infection rate remained at its customary fairly high monthly rate of about 8 per cent until the middle of the year. Shortly after, prophylactic prothidium was given. Whether the reduced infection rate, which continued to the end of the year, should be attributed to the drug is not yet certain. Ten deaths were attributed to trypanosomiasis; these were all at Tunguu. Although fly rounds with a bait ox produced no tsetse fly at Pangeni it is assumed that they are present from time to time. The animals are accordingly being given trypanosomiasis prophylaxis, half being treated with antrycide prosalt and half with prothidium. *Stomoxys* may present a problem after the rains.

A few small changes in management were put into operation. Bull calves were not castrated so early as formerly, being allowed to continue entire up to nine months if necessary, in order to judge whether they would be likely to have the necessary conformation to make useful stud bulls. The sending of unwanted male calves from Kizimbani to Hanyegwa was stopped when it became clear that they rarely did well under their new conditions. Their growth and general health were usually markedly inferior compared with calves born and brought up at Hanyegwa on their dams, even though the Hanyegwa dams did not approach the quality of the Kizimbani dams. All calves at both ranches are weighed at birth and thereafter once a month, the females until they come in calf and the bullocks until they are sold for slaughter.

Six goats were purchased locally and kept at Tunguu to see whether there would be any possibility of goats performing a useful service in these ranches by destroying bush regrowth, after cutting and burning. As they would constitute a reservoir for trypanosomiasis they were inoculated with prothidium. Three of them died the same day showing symptoms suggestive of poisoning by the drug.

With the aim of providing fresh green food or silage for down-calving cows and the stud bulls during dry periods, a well has been dug at a low point on the Tunguu ranch from which it is hoped to irrigate some 2 to 6 acres. It is intended also to investigate the practical and economic possibilities of stall-feeding, especially in the case of animals almost ready for slaughter.

VETERINARY ACTIVITIES (DISEASE CONTROL).

The Veterinary Section of the department continued to provide diagnostic and curative services at its headquarters in Zanzibar and at Wete in Pemba, and also at four small clinics in Pemba and two in Zanzibar. In addition, a travelling clinic continued in operation in Zanzibar following scheduled routes, particularly in trypanosomiasis areas.

The numbers of cases treated during the year were as follows:—

			<i>Cattle</i>	<i>Goats and Sheep</i>	<i>Donkeys and Mules</i>	<i>Dogs and Cats</i>	<i>Poultry</i>	<i>Others</i>
Zanzibar	..	..	3,436	305	257	601	1,965	12
Pemba	..	..	710	59	12	145	786	1
		TOTAL	<u>4,146</u>	<u>364</u>	<u>269</u>	<u>746</u>	<u>2,751</u>	<u>13</u>

In Zanzibar the number of cattle treated dropped by 500. The fall was due to a reduction in the incidence of a number of different ailments. In Pemba there was a satisfactory increase of about 200 in the number of cattle cases indicating that the fall which occurred last year was probably due not so much to an attempt to collect treatment fees more frequently as to pre-occupation with the clove crop. Apart from certain specific and epidemic diseases, an increase in the number of cases is welcomed because it means that more stock owners are accepting veterinary treatment.

In Pemba, where there is still no tsetse fly and no trypanosomiasis, wounds and ophthalmia as usual constituted the most numerous ailments in cattle. Although east coast fever is ubiquitous in Pemba, only 8 animals were brought for treatment. Anaplasmosis and babesiosis added a further 33 cases to the total of tick-borne diseases treated. In Zanzibar a total of 391 cases of tick-borne disease were treated as compared with 190 in 1957. Of these cases babesiosis accounted for 269.

Of the cattle ailments treated in Zanzibar, trypanosomiasis was again the cause of the greatest number of cases and 1,013 animals were treated for the disease. Helminthiasis (639 cases) and wounds (456 cases) were the next most common ailments as in 1957. In goats and sheep, wounds were the most common ailments treated, but helminthiasis was also important. Wounds were overwhelmingly the commonest ailment in donkeys, and in Pemba mange was also troublesome. One donkey suffered from hypocalcaemia as did two cattle and one sheep. Coccidiosis was the commonest ailment amongst poultry, other ailments being helminthiasis, pox and coryza. Newcastle disease appeared for the first time.

The imported grade cattle owned by the commercial dairymen who supply Zanzibar town with milk are dipped regularly. Other cattle being dipped are the department's cattle on the Hanyegwa ranch and the Kizimbani farm, and the cattle of people living on the edges of the farm. In Pemba a group of cattle owners continue to make use of one of the three dips, bringing about 50 animals each week. At another dip where only Government cattle have been dipped for years, a few animals were brought, the numbers gradually working up to 20 a week at the end of the year.

Although dipping is not accepted by the majority of small cattle owners, spraying is becoming popular. There are probably two reasons for this; the fear of accidents with dipping and the fact that spraying is at present done at any convenient place where a few cattle may be gathered together, thus reducing walking to a minimum. No charge is made for dipping or spraying, but if the latter continues to expand the expense will become prohibitive unless the cattle owners contribute in some manner. In Zanzibar, spraying has made most progress in the south, at Makunduchi,

where the majority of the animals are now sprayed weekly. In Pemba a mobile team covered the north of the island while the Veterinary Assistants of the central and southern areas covered their areas with whatever means of local transport was available. This method produced results little short of those given by the mobile team. The average numbers of animals sprayed per week are shown in the following table:—

			1958	1957	1956	1955
Zanzibar	..	..	909	619	568	248
Pemba	..	..	469	295	165	—
TOTAL			1,378	914	733	248

Monthly examinations of the blood of all animals at the department's ranches, since the inception of the scheme, have enabled a close watch to be kept on the incidence of trypanosomiasis. Prophylaxis with antrycide pro-salt was continued at Hanyegwa Mchana, where inoculation every four months has given good results. From an average monthly infection rate of over 13 animals in 1956, the incidence dropped to only 1 animal in 3 separate months in 1958. Less success was obtained with prothidium at Tunguu, where the challenge is higher. The average monthly infection rate at this ranch during 1957 was 7.0 per cent, while on two occasions in 1956 it had reached 17 per cent. During the first six months of 1958 the rate averaged 6.6 per cent, though in June it was down to 2.9 per cent. In July the animals were inoculated with prothidium. No positive animals were found in that month and the infection rate remained below 0.3 per cent in August and September. Thereafter it rose to 3.3 per cent and the animals were inoculated again in December.

Preliminary inoculations with prothidium on six test animals showed that local reactions were sometimes severe, sores being formed. The caudal fold was found to be the best site. Six goats were also treated, using the scale of dosage recommended for cattle. They received from 2 c.c. to 2.5 c.c. each. Two were given the drug intramuscularly under the sternum and four subcutaneously in the caudal fold. Of these latter, three died the same day. Autopsy showed necrosis of the liver.

Newcastle disease of poultry was diagnosed for the first time in Zanzibar. Found scattered through Zanzibar island in March it had apparently been in the country for a few weeks. The disease was sub-acute with an average mortality of 60 per cent. Adult and young birds were affected, the most prominent clinical signs being nervous derangements. Vaccine obtained from Kenya was administered to four affected flocks and was found effective in providing protection.

The poultry mite, *Dermanyssus gallinae* caused much discomfort to householders in the north of Zanzibar for a short period. Even houses without poultry were affected. Of the insecticides tried Agrocide was the most effective; used at the rate of about 1 lb. for an average sized house it successfully cleared the mites from 262 houses.

6. Forestry

Administrative action preparatory to the declaration of the mangrove areas as forest reserves was continued. In Zanzibar the reports of the Reserve Settlement Officers were completed in respect of most of the

areas, while in Pemba the areas were gazetted and a Reserve Settlement Officer (the Senior Mudir) was appointed. He had made progress in the north of the island by the end of the year.

Meanwhile some degree of control and protection was maintained by the controlled issue of cutting permits under the Woodcutting Decree. There is some lack of observance of the provisions of this decree, varying in extent from place to place. While some villages have strictly refrained from cutting mangrove poles in closed areas, others have been actively engaged in deliberate cutting without permit and in the commercial exploitation of the poles. In the area in Zanzibar most actively concerned, patrol action resulted in 34 persons being prosecuted; 17 convictions were obtained. In Pemba 20 prosecutions resulted in 19 convictions for similar offences.

The extent of the mangrove cutting activities in the two islands is indicated in the following table where the number of poles of different types for which cutting permits were given are shown in respect of Pemba and the principal cutting area of Zanzibar. All figures for the numbers of poles are in scores except fitos which are in units of one.

Type	Chwaka Bay Zanzibar	Pemba special	Pemba ordinary
Nguzo	1,699	419	4,608
Boriti	1,118	275	3,601
Makombamoyo ..	1,660	78	1,646
Miamba	194	233	4,621
Mapau	3,607	310	5,114
Fitos	359,760	38,100	570,830
Number of permits issued	473	120	1,142

Note.—“Pemba special” refers to the two species *Bruguiera* and *Rhizophora* only. These species contain sufficient tannin in their bark to make it commercially exploitable provided the trees are of a sufficient girth. They are therefore more rigorously protected than the other species.

At Jozani forest, the concessionaire's lease came to an end during the year, and he removed his sawmill. He had been cutting *mtondoo* (*Calophyllum inophyllum*) and *mfuu* (*Vitex cuneata*). The policy for this forest embraces the tending and encouragement of self-sown *mtondoo*, the planting of nursery-grown *mtondoo*, and the planting of *eucalyptus* in the surrounding open areas. Good progress has been made with this work in recent years, 40 acres being planted in 1956, 60 acres in 1957 and 70 acres in 1958. This latter involved some 21,400 plants of *mtondoo* and 2,000 of *eucalyptus*. Almost all the young trees are growing well.

A dispute regarding ownership of the forest has arisen with certain of the local people who claim a prescriptive right to cut all forest produce therein. The report of the Reserve Settlement Officer on the area is awaited. Meanwhile Jozani forest has not yet been declared a forest reserve.

At Ngezi forest, Pemba, the concessionaire made no progress in the felling and marketing of timber. Once again, therefore, infill planting in compartments which were expected to have been fully exploited by 1958 was not possible. Consequently the work of regenerating the forest with valuable timber species was restricted to certain sections of the forest

having a thinner canopy. Here, 2,345 *mvule* (*Chlorophora excelsa*) stumps were planted in two compartments—about 80 acres. Small numbers of *mtondoo*, *muavi* (*Erythrophloeum guineense*) and teak were also planted.

The planting and tending of a forest cover to clothe the Masingini ridge, the source of Zanzibar town's water supply, continued according to plan. Some 4,000 *casuarina* and *eucalyptus* seedlings were planted, together with a few pre-germinated *mtondoo* seedlings. The portion of Masingini acquired by Government in 1956 can now be considered to be fully planted and arrangements are being made to acquire more land along the ridge for extension of the forest area.

One of the forest areas to suffer most from the light and irregular main rains was Dunga where an important part of the development planting of fuel species has been in operation. Under such conditions it was decided in 1958 to concentrate strongly on the maintenance of plantings already carried out rather than on fresh planting. For the replacement of deaths some 49,200 *eucalyptus* seedlings were transplanted between early April and late June. Inadequate rain resulted in the wastage of a high proportion of seedlings in the nursery.

A new area of about 10 acres was planted with 4,000 *eucalyptus* seedlings at Kichwele, by the resident prison labour. The planting programme for Kichwele had been set at 60 acres per year, but shortage of prison labour has made this impossible. Some 3,500 *eucalyptus* seedlings were used for replacements. The earlier plantings at this centre have made good growth, and some of the *eucalyptus* trees have reached a height of over 50 feet in five years.

No new planting was undertaken at Walezo-Chumbuni but the plantation was well maintained with prison labour.

For the second year, the Provincial Administration organised the voluntary planting of seedlings of *Casuarina* and *Eucalyptus* by the villagers of the east coast villages of Uroa, Chwaka, Bweju and Makunduchi. 10,000 seedlings were planted but had the weather been more favourable the figure would have been much greater.

Experimental planting of various exotic species continued on a small scale. Of 14 species of *Eucalyptus* under test none have compared with *E. camaldulensis*, the species used in all recent plantings. Pines have been under trial since 1951; the species *Pinus elliottii* (*caribea*) and *P. pinca* are considered to be unsuitable in spite of the soil having been inoculated with pine soil from Tanganyika to provide *mycorrhiza*. *Pinus patula* planted in 1957 is more promising, while *P. radiata* is doing slightly less well. *Araucaria cookii* and *A. cunninghamii* have made fair growth, the former growing the better of the two.

Seed of *Eucalyptus camaldulensis* was supplied in small quantities to Kenya, Tanganyika, Uganda and Nyasaland. The Zanzibar strain, which has been identified in Australia as *E. tereticornis*, has been found to give quick and straight growth on the mainland. Seed of *Acacia auriculiformis*, which has proved to be a hardy, quick-growing and dependable species in Zanzibar, was supplied to Tanganyika, Uganda and Madagascar. Seed of *Grevillea robusta* was received from Tanganyika.

7. Fisheries

There is little doubt that Zanzibar is far from realising the full fishing potential of the seas around its coasts. It is estimated that about 9,000 persons are employed erratically in fishing from the shore and from some 3,000 assorted fishing craft operated from 150 fishing beaches in Zanzibar and Pemba. The traditional dug-out canoe with out-riggers, called an *ngalawa*, is still the most popular craft for fishing and over 1,600 are in operation. As the movements of fishermen operating in this way are very limited, fishing is a day to day business, and the quantities of fish reaching the market tend to be erratic. This variation is accentuated by the fact that there are no cold storage facilities for holding fish over from one day to the next and that consequently a fisherman must get his fish to the market before noon in order to catch the day's shoppers. If he fails to do this he will get only a poor price. Without cold storage facilities, large catches of fresh fish which must be sold immediately are apt to flood the market and do not bring the fisherman a proportionate remuneration. He therefore has little incentive to obtain the maximum catches of which even his present methods are capable.

Total estimated catches brought to the main Zanzibar town market in 1958 amounted to 72 tons only. It is unlikely that much more than twice this quantity was sold at other small markets in town or directly in the streets or at nearby beaches. With a resident population of 58,000 the consumption per head per annum was therefore probably no more than 8.5 lb. in Zanzibar town. It is unlikely to be higher in the country districts except in the fishing villages. In Burma the figure has been stated to be 70 lb., in Ceylon 16 lb. and in India 3.4 lb. only. Meanwhile Zanzibar imports a considerable part of its needs of animal protein in the form of cattle from Tanganyika, goats from Somalia and dried fish from Arabia. That the Protectorate could well increase its consumption of local fish is clear. Fisheries development work has had this as its ultimate object.

During 1958 no further progress was made in introducing powered fishing, and only two boats were in operation during the year. One of these was finally returned by the charterer as he found he was unable to give sufficient time to supervision to ensure financial returns to himself. The other vessel continued to operate successfully and to provide an example to others.

The application of the loans scheme, under which the powered fishing boats were issued, to nylon nets and outboard motors did not become operative until October, 1958. Nevertheless, before the end of the year fourteen applicants had obtained loans amounting to £677 for the purchase of nylon nets. To purchase a net costing Shs. 1,350/- a fisherman pays Shs. 350/- cash and receives a loan of Shs. 1,000/-, and for a net costing Shs. 750/- the cash payment is Shs. 250/- and the loan Shs. 500/-. The security for these loans is the fishing craft owned by the applicant.

No outboard motors were purchased before the end of the year. The cost of these is £75 of which applicants are required to deposit £25. Familiarisation with modern nets and later with outboard motors may eventually lead to acceptance of the opportunity offered to obtain powered fishing vessels.

The year 1958 has seen the beginning of the crawfish and crab export industry. Organised by a new Zanzibar company, catching is in the hands of local fishermen whose nucleus was trained by the fisheries section. These men in turn train a group of four to six men from each beach where catching is to be done. This venture has already brought added wealth to the village fishermen and in consequence one group has initiated a bus service for the transport to town of fish, lime and passengers.

8. Education

A rather unusual form of village training was continued in Zanzibar in seven villages mostly situated in the eastern half of the island. This work is undertaken by an Assistant Agricultural Officer with the minimum of assistance, and the first essential objective is undoubtedly the establishment of confidence between him and groups of some 10 to 20 farmers in each of the seven villages. Original suspicions and hesitation have been overcome by adopting a most patient and slow approach. Nevertheless, circumspection is still required and the pace cannot be forced. For example the group in a village situated in a very good citrus growing area was quite unprepared to listen to lectures on budded citrus. On the other hand the group has done well in purchasing fertilizers for rice.

The method of working has not changed. The officer endeavours to concentrate for about two weeks at a time on each village in turn. During this period he visits the village for talks with the group during the afternoon and early evening. Sometimes a particular subject may be expounded, sometimes the members of the group lead the conversation. At these meetings arrangements are made to meet members of the group in their fields on a subsequent morning. The officer also arranges to undertake errands for the group, such as collecting planting material or fertilizers.

At each village, development has tended to take place along individual lines. Thus at Jendele and Ndijani the emphasis has been on the use of fertilizers on the rice crop. At Uroa lectures on lime growing have resulted in the formation of a co-operative society and the submission of a request for lime plants. This area also showed interest in chillies and took 20,000 seedlings collected by the Assistant Agricultural Officer from Government nurseries. At Uzini, which is a fertile area, the need for crop diversification has begun to be appreciated. As a result the Uzini group planted 1,000 coffee seedlings and 2,000 kapok. At Muyuni and Upenja there is less evidence of concrete improvements. In Bweleo village the main interests are cattle, goats and fishing. Since the classes have started, cultivation has increased tenfold. The villagers are also showing a keen interest in beef production and are considering forming a co-operative society to run a cattle ranch.

In all, the work is progressing well. The tempo may appear slow but every new step, every improvement is one that has been carefully considered and finally accepted by the farmers, and should therefore have every likelihood of becoming a permanent feature of their agriculture. In addition to the practical advances that have been made, the village training has enabled the department to establish valuable contacts and strong ties with the peasant farmers.

Almost all the field staff of the department are involved in education in a greater or lesser degree. From the daily-paid employee who may be talking to passers-by while preparing a heap of compost or showing his wife some new method he has learned to the degree man discussing a disease or a cropping plan with a plantation owner, or lecturing to a group of teachers in training, there is a range of staff of all grades who spend much time in contact with the general public. Where confidence and understanding is attained, such contacts may be more fruitful than most other methods. For this reason it is very advisable that all such staff should be fully aware of the department's policy in so far as their capabilities allow. The psychology of the approach is important; a peasant farmer in the south of Zanzibar was most happy to conduct the District Agricultural Officer around his fields and to explain his plans, but excused himself when it was suggested that he might like to make a return visit, with the officer, to the departmental demonstration farm which was less than a mile distant. Apparently he did not want to be put into a position where he might, as he feared, be considered a 'learner'.

Efforts to reach the general public are also made through the radio, and in 1958 the regular fifteen minute broadcasts were increased from one every two weeks to one every week. They take the form of talks, discussions, interviews with farmers and a play series involving two farmers and their families. It is believed that all these approaches have value, each appealing to different members of the public.

An agricultural show was held at Matangatwani farm in Pemba in August. Large numbers of people attended and there were still some 3,000 to 4,000 present at prize giving, shortly before the show was closed. There were display stands prepared by the Department of Agriculture, other Government departments and the Clove Growers' Association. In addition there were competitive exhibits of crops, stock and handicrafts.

No show was held in Zanzibar. Instead, two Farmers' Days were organised at Kizimbani farm to which some 40 to 50 farmers were invited personally. At these gatherings the farmers spend both morning and afternoon seeing the work of the farm and are provided with lunch. There is much discussion and questioning on these occasions and it may well be that in Zanzibar island at least, they are more effective than shows in improving the knowledge and practice of agriculture in the Protectorate.

Members of the senior staff lectured to teachers-in-training and to secondary school pupils from time to time as requested. One officer gave a series of lectures to trainee rural health workers on soil fertility, soil conservation, and nutrition in relation to available foodstuffs. Schools which maintained school gardens were visited from time to time by the

district staff. In Pemba one field assistant was for a time given the responsibility of visiting and advising all schools in the district. In both islands there are some schools which have adequate land and which manage, in spite of the difficulties caused by holidays, to maintain from year to year school gardens which are productive, interesting and of educational value.

As in previous years, a Tree Planting Day was held in Zanzibar island during April and on this occasion 1,000 kapok seedlings were distributed free. Issues were made with the assistance of the Provincial Administration and most of the plants were taken by schools.

9. Distribution of Planting Material

A list of the planting materials distributed in 1958 is given in Appendix II. The materials covered the same range as in previous years. The Clove Growers' Association provided the department with funds for the production of more than half the clove and coffee seedlings, and of all the chillie seedlings and rooted derris cuttings. All materials produced with these funds were issued free. The production of coconut seedlings was similarly financed by the Copra Board and seedlings were sold at 10 cents each. Clove and coffee seedlings produced wholly at Government expense were sold at 10 cents and 30 cents respectively. All other seedlings were sold at 30 cents, and worked plants at Shs. 2/- each. Planting material of food crops was mostly issued free.

10. Government Plantations

The year 1958 was characterised by low rainfall and a small clove crop. It was evident at the beginning of the year that revenue would be greatly reduced, but the policy of gradual improvement of the plantations through adequate maintenance and continued planting of cash crops was not departed from. This is a policy which should bear fruit in future years, but it cannot be applied in certain of the plantations where considerations such as the dictates of urban expansion have over-riding force.

The accounts for the year, which are given in Appendix I, show a net loss of £4,469. As in previous years, the plantations of Chukwani and Jendele, which cannot be considered to be economic from a purely agricultural point of view, lost money. The two plantations of Kidichi and Selem, which are the main revenue earners when there is a clove crop, also showed a loss, due to the fact that not more than £34 worth of cloves was harvested during the season. At Mtoni, a coconut plantation, a small profit was made.

The productive area of the plantations was reduced by about seven acres as a result of felling of coconut trees for various public purposes, including a passage for electric cable to Mtoni, improvement of the landing area at the airport, clearing for Government buildings and the lease of an area for the bulk storage of fuel.

Labour was freely available throughout the year. Indeed, at one period a super-abundance of coconut climbers and gatherers sought work, explaining that owners of plantations where they normally obtained employment had refused to employ them unless they joined a certain

political party. The owners' and lessees' need to harvest their nuts, however, did not allow this attitude to persist. The minimum wage rate for all Government daily-paid employees was raised to Shs. 3/60 at the beginning of the year and was retained at this level throughout. Piece rates for certain coconut operatives, which during the 1957 clove season had been raised on Government plantations to accord with the rates paid by the public, were reduced in April for the same reason.

A Marden weed cutter for use with a Fordson tractor was obtained in June. It was employed mainly for cleaning an overgrown area containing scattered clove trees, in which young trees will later be planted. It was also used effectively under coconut palms. The Ferguson tractor was used mainly for collecting coconuts from the field.

During 1958 a total of 6,327 clove seedlings were planted, of which 3,377 were for filling gaps and 2,950 were for a new area on the Kidichi plantation. Continued use was made of bananas as a nurse crop. Artificial shading of individual plants was required in some plantings and watering was necessary during the severe dry weather of January and February. Mulching was very effective in conserving moisture and reducing losses. A number of old clove trees died during this period, probably because of drought. The control of dieback disease by the regular cutting out of infected branches was continued.

The 1958/59 clove crop was very small. It consisted of both *mwaka* and *vuli* crop and harvesting was completed in January, 1959. It was unnecessary to recruit special clove pickers for the harvest, the work being done either by the plantation patrols or by the field labour on daily rates of pay. Of the total quantity of 20,676 lb. of green cloves obtained at the conclusion of harvesting in January, approximately half was from Selem and half from Kidichi.

In the following table the 1958/59 harvest figures are compared with those of previous years.

Season		Green cloves lb.	Dry cloves lb.	Dry stems lb.	Average clove prices per cental Shs.
1958-59		20,176	6,224	1,595	112.36
1957-58		319,118	99,248	23,046	198.02
1956-57		212,165	71,455	19,994	198.30
1955-56		61,916	19,775	5,537	199.32

The coconut crop on Government plantations, contrary to expectations, was no more than average. The first gathering was exceptionally large, since it had not been possible to undertake a fourth gathering in 1957 owing to shortage of labour. But the second and third gatherings were smaller than usual. This pattern was not confined to Government plantations but was also experienced elsewhere. A total of 2,290,257 nuts were harvested, as compared with 2,512,199 nuts in 1957 and 2,408,495 in 1956. The total costs of gathering amounted to £3,043 as compared with £2,686 in 1957 (Shs. 26/57 per 1,000 nuts as compared with Shs. 21/38), although the crop was greater in 1957. This is accounted for by the fact that the bulk of the 1957 crop was reaped before harvesting rates were raised in October, whereas the heavy picking in 1958 took place before the rates had been reduced. The reduction, in any case, constituted only a partial return to the rates of early 1957.

The majority of the nuts gathered were made into copra. The Copra Board purchased 100,000 for seed. No whole nuts were exported. The following table gives details of the production of copra in 1958 and previous years.

Year			Nuts made into copra	Copra made tons	Nuts per ton of copra	Average price of copra per cental Shs.
1958	..	..	2,175,262	302	7,194	51.13
1957	..	..	2,232,031	304	7,344	44.35
1956	..	..	2,327,369	325	7,153	44.89
1955	..	..	2,122,212	306	6,945	40.60

It will be noted that the trend during the last few years towards a poorer out-turn appears to have been halted.

A small coconut nursery was maintained in order to meet the plantations' needs. Germination was 79 per cent, a high figure. Some 1,000 seedlings were used in new plantings and 632 for filling gaps in recent plantings. A small number was also sold to the public. In 1957 an area of nearly 17 acres at Dole had been planted with coconuts along narrow cleared strips. These strips were widened to six feet, and a further area of about 13 acres was added, the same method of planting being followed.

A total of 410 coconut palms was lost during the year for various causes, the most important being intentional fellings for non-agricultural purposes. In addition, six acres of coconuts at Kidichi plantation were cleared to provide a trial plot for cocoa on land which appears to have the requisite water relations. It is estimated that there were 111,516 coconut palms of all ages in the various plantations at the end of the year. Rangers and patrols were maintained as usual, and 20 thieves were caught stealing coconuts.

Expenditure on cocoa was some Shs. 3,000/- less than in 1957, which was Shs. 5,000/- less than in 1956. This has not been at the expense of planting, over 2,000 cocoa plants being planted in 1958 as compared with about 1,700 in 1957. All plantings were of the *forastero* variety, 1,641 being seedlings and 390 stem cuttings. Most of the latter were planted in a new plot at Langoni, Kidichi plantation, while the seedlings were planted at Selem. The majority of these were used to replace *criollo* trees which had proved to be a failure.

Vegetative propagation of cocoa continued on a small scale. Of 827 stem cuttings dealt with during the year, 680 were propagated in the standard glass propagator, and 147 were planted direct into baskets and then covered with polythene sheet. The latter method, which was being tried for the first time, appears likely to result in a reduction of costs in this work.

In the field, coir dust was found useful as a mulch for young cocoa plants, evidently retaining moisture very satisfactorily. Several well-grown young *criollo* cocoa trees planted some six years ago under partially thinned natural forest at Kidichi died during the year. The disease was not positively diagnosed but it was undoubtedly some root disease.

The plantations section continued to operate a cocoa fermentary at which cocoa belonging both to Government and to private individuals was prepared, free of charge. The cocoa beans were sent to the Clove Growers Association for marketing.

Harvesting of limes at the citrus pilot plots was carried out throughout the year, there being no month in which at least a small quantity was not available. The greatest monthly pickings were made in the period from April to August, with another peak in November. Nevertheless, the total crop for the year was poor, for the main flowering in November, 1957, which occurred at a time of heavy rainfall with fairly high temperatures, was very severely damaged by wither-tip disease. In all, 157,818 marketable limes, weighing a little over $9\frac{1}{2}$ tons, were harvested during the year, as compared with 417,453 limes ($23\frac{1}{2}$ tons) in 1957. This gives a figure of 99 limes per tree in 1958 compared with 261 in 1957 and 134 in 1956. In spite of the poor yield the plot gave a net profit of Shs. 119/60 per acre, or cts. 60 per tree.

The plantations section continued to make compost for sale to the public and to Government. Some 405 tons were sold. This is 50 to 100 tons less than has been sold in recent years. The cost of production was reduced from over Shs. 10/- a ton in 1957 to Shs. 9/- a ton in 1958, but at a sale price of Shs. 7/50 a ton, compost is still a subsidised product. For the first time coir fibre dust was included in considerable quantities in the compost.

11. Chemical Laboratory

Continuing a survey of the trace element status of the soils of the Protectorate, two Zanzibar soils and one from Pemba were investigated in pot tests. Poor growth of the indicator plants in *kinongo* and *kinyofu* soil gave indeterminate results, but the test with *uwanda* soil showed it to be well supplied with manganese, copper, boron, zinc and molybdenum.

Analysis of coir dust ash and rice husk ash showed that the former contained over 11 per cent of soluble K_2O and the latter 0.13 per cent. To test the effectiveness of the coir dust ash as a fertilizer it was compared in a microplot experiment with muriate of potash. The experiment gave no positive results, for there was no response to either fertilizer although the soil type is usually deficient in potash. The site had been under grass, probably for several years; this may have affected its potash status.

Continuing the programme of analysis of the profiles of Pemba soil types, the *utasi* soil, which is found largely in the north of the island, was examined. This soil is well known for having a deep compact layer which is referred to locally as *fuawe* or *fuwe* and to which is sometimes attributed poor health or degeneration of various crops. It was established that total exchangeable cations are low (1 to 5 m.e. per cent) and decrease down the profile to the *fuawe* layer where they reach a minimum and then increase again with greater depth. Total nitrogen and available phosphates are also low in this soil type.

With a depleted staff the work of the section was concerned less with pedological work than with routine analysis and reports and general chemical work. A total of 2,331 samples were dealt with, averaging 7 to

8 a day. Of these, 2,261 samples were submitted by Government and 70 by private persons or firms. In the agricultural field the most numerous were official samples of coconut oil, which totalled 1,467 and represented $7\frac{1}{2}$ million pounds of exported oil. They were analysed for water and extraneous matter and 10 per cent failed to reach the export standard. In 1958 one sample was taken for every 10 drums of oil exported whereas formerly each sample represented 30 drums.

Clove bud and clove stem oils for export were analysed for eugenol content. Stocks of racked lime juice and batches of juice sweetened and bottled for sale were checked regularly for preservative content. Nutmeg oil was distilled from Zanzibar nutmegs and was shown to have the physical characteristics of West Indian oil.

Poison baits for crows and for pigs were prepared periodically throughout the year, and the customary morbid and forensic exhibits were examined for the Health and Police Departments as required.

12. Produce Inspection

Inspection of the Protectorate's principal agricultural export produce continued on normal lines, being carried out in two stages. Under the Adulteration of Produce Decree all cloves, clove stems and copra offered on the Zanzibar market or shipped from Pemba to Zanzibar or sold to the Clove Growers Association are examined for moisture content and cleanliness. If found to be below certain standards the produce is rejected and returned to the producer or merchant for drying or cleaning. Pemba produce is inspected in Pemba and again on arrival in Zanzibar, since maintenance of standards during the journeys cannot be guaranteed.

Immediately prior to export, cloves, copra, coconut oil and chillies are examined under the Agricultural Produce Export Decree, which establishes export grades. Certain other produce is inspected and reported on prior to export at the request of the exporter, although this is not required by law.

There was a steady flow of arrivals of cloves into both Pemba and Zanzibar markets throughout the year, with no marked difference between harvest seasons and other periods. This was due to there having been a carry over from the 1957 harvest, while the 1958 harvest was small. The 1958 crop cloves were of good quality and the amount of khoker cloves offered was very small indeed. Extraneous matter was generally below 3 per cent.

Market arrivals of copra were exceptionally high during the first six months of the year. This was largely due to the fact that pre-occupation with the clove crop in late 1957, particularly in Pemba, had precluded coconut picking and copra manufacture at that time. Moreover an improvement in the export trade stimulated deliveries. Total deliveries for the year were the highest since 1954. For the first time Pemba deliveries amounted to one third of the total brought onto the Zanzibar market.

The quantities of produce examined under the Adulteration of Produce Decree, in Pemba at the three ports and the Clove Growers Association's godowns and in Zanzibar at the produce market, during the calendar year were as follows:—

Produce and origin	Deliveries bags	Passed bags	Failed bags		Percentage of failures
			Excessive moisture	Extraneous matter	
At Pemba :					
Cloves	141,643	128,736	4,558	7,349	8.4
Clove stems	128,629	126,698	169	1,752	1.5
Copra	102,938	100,585	313	2,040	2.3
Total produce ..	373,210	356,019	5,040	11,141	4.3
At Zanzibar :					
Zanzibar cloves ..	23,238	22,877	303	58	1.6
Pemba cloves ..	169,142	153,128	12,012	4,002	9.4
Zanzibar clove stems	17,206	17,206	—	—	—
Zanzibar copra ..	185,107	178,714	5,372	1,021	3.4
Pemba copra ..	95,774	93,267	1,360	1,147	2.6
Total produce ..	490,467	465,192	19,047	6,228	5.2
Protectorate total pro- duce					
	863,677	821,211	24,087	17,369	4.8

The total number of bags examined under the Decree, at 863,677, showed a 25 per cent reduction on the figure for 1957, when a bumper clove harvest was being delivered. Bags of clove stems, however, were more than twice as numerous as in 1957, while copra showed an increase of nearly 44 per cent. Percentage failures of all produce decreased quite considerably in Pemba as did failures of Zanzibar cloves in Zanzibar. But Pemba cloves on arrival in Zanzibar were rejected to a greater degree, in contrast to Pemba copra which improved its position *vis-à-vis* Zanzibar copra.

Produce examined prior to export included 147,362 bales of cloves, 10,102 tons of copra, 17,348 drums and 4,038 tins of coconut oil and 1,312 bags of chillies.

Although the cloves for export were dry, the maintenance of a fair average quality required strict application of the inspection standards, for some traders held appreciable quantities of khoker cloves, produced during the late rains of 1957.

Inspection of coconut oil for export was made more thorough by the reduction from 30 to 10 in the number of drums from which samples were taken to give a single bulk sample for the determination of moisture and free fatty acid contents. Ten per cent of the samples examined (in the Chemical Laboratory) were rejected as being below export standards. Seven per cent failed in 1957 and 6 per cent in 1956. Excess moisture was again the chief cause of failure, 97 per cent of the failures containing moisture in excess of 1 per cent.

The inspection and disinfestation of produce passing through Zanzibar port was also under the general control of the Inspector of Produce. This work is described in the following section.

13. Stored Products

In its work in connection with the pests of stored products the department has been mainly concerned with prevention of the entry of *Trogoderma granarium* on imported foodstuffs and its destruction whenever

found. At the same time, the action that has been taken to this end has done much to reduce infestation of foodstuffs by other insect pests in Zanzibar town.

Following the introduction of *Trogoderma* in a consignment of cowpeas in 1956, foodstuffs imported from Asia, certain areas of Australasia and Central Africa have been fumigated either in the country of origin or on arrival in Zanzibar. During 1957 shipments of rice from Burma were invariably heavily infested with *Trogoderma* whereas those from Thailand were free from it. In February, 1958, *Trogoderma* larvae in large numbers were found for the first time in cargo from Singapore. It is believed that the cargo, Siamese rice, was cross infested either in Singapore or in the hold after leaving there. In May, one consignment of Siam rice which had been loaded at Bangkok was also found to be infested on arrival. In September, October, and December five shipments of spices and general cargo from India loaded at Bombay arrived infested. In these instances the cargo originating the infestation appeared to be coriander. One consignment of simsim from Mozambique, loaded at Port Amelia, was infested. All of the ten shipments of Burma rice received during the year, amounting to 3,373 tons, were heavily infested. In all, 198 vessels were met on arrival and their cargoes examined. Eighteen of them were found to be carrying *Trogoderma*.

The majority of the infested cargoes were fumigated in lighters prior to landing. This is an effective and convenient method ensuring that the lighters do not infest clean cargoes when used subsequently. It was usually necessary to fumigate all cargo landed from a hatch containing infested cargo, whether or not it appeared to be infested, but clean cargo from a separate hatch was not fumigated.

In order to safeguard the position on the mainland and as an internal control measure, used gunny bags and articles and merchandise wrapped in such material destined for Kenya and Tanganyika were fumigated before shipment. This was carried out in a godown in the port area. Altogether, for both import and export, 27 fumigations were undertaken during the year. These involved 58,463 bags of foodstuffs, 5,808 bundles of second hand empty bags, 1,100 packages of general merchandise and 100 bales of new gunny bags.

Fumigation in all cases consisted of exposure to methyl bromide at a minimum concentration of 3 lb. per 1,000 cu. ft. for a period of 24 or more hours. Fumigation was carried out by a commercial company. For fumigation in the godown the material was stacked and covered with sheets, the methyl bromide being led in under the sheets through piping.

Fifty one inspections of town godowns and oil mills were undertaken during the year. Three of these revealed infestation with *Trogoderma*. The contents of these godowns were removed and fumigated in the godown used for export fumigations, and the buildings were cleaned and drench sprayed with malathion. On re-use, the godown and produce stored therein were dusted with 0.5 per cent B.H.C. For mixing with susceptible grain 0.04 per cent B.H.C. was used. This procedure of cleaning, spraying and dusting was also carried out in cases where severe infestation

by pests other than *Trogoderma* occurred or where *Trogoderma* was suspected. The dusts were also made available at cost to merchants and some 1,400 lb. was purchased by them.

Staff concerned with inspection for *Trogoderma* also undertook the examination of plants in connection with the plant protection services.

14. Principal Agricultural Legislation

The following is a list of the more important agricultural legislation promulgated during the year.

Decree No. 3.	The Animals (Control of Experiments) Decree, 1958. Limits experimenting on living animals to persons specially licensed and regulates the performance of such experiments.	28.4.58
Legal Notice No. 3.	The Animal Diseases Decree, 1948. Amends the schedule of notifiable diseases, deleting anaplasmosis and including lumpy skin disease and neurolymphomatosis.	8.1.58
Legal Notice No. 12.	The Animal Diseases (Prohibition of Importation of Animals) Regulations, 1958. Prohibit the importation of all cattle from Kenya, as a temporary measure to prevent the entry of lumpy skin disease.	21.1.58
Legal Notice No. 11.	The Plant Protection (Compulsory Fumigation of Imports) (Amendment) Order, 1958. Permits the entry of various grains and articles likely to harbour <i>Trogoderma granarium</i> if shipped from Mocambique and Port Amelia, where there are no fumigation facilities, provided the importer undertakes to have the articles fumigated on arrival if required to do so.	22.1.58
Legal Notices Nos. 68, 69, 70, 71, 72, 73, 74, 75, 76.	The Forest Reserves Decree, 1950 Notices of intention to constitute as Forest Reserves mangrove forests in the mudirias of Konde, Wete, Chake Chake and Mkoani in Pemba District, including the Matumbini Islands.	31.7.58 5.8.58

A. K. BRIANT,
Director of Agriculture

July, 1959.

Statement of Revenue and Expenditure of the Government Plantations

EXPENDITURE TO THE NEAREST £

	<i>Kidichi</i>	<i>Selem</i>	<i>Mtoni</i>	<i>Chukwani</i>	<i>Jendele</i>	<i>Total</i>
	£	£	£	£	£	£
Cloves and stems	92	5	3	—	—	100
Copra	9,506	1,742	3,412	2,279	—	16,939
Coconuts	785	174	177	18	—	1,154
Coconut crop	13	9	232	95	52	401
Miscellaneous	417	86	537	15	3	1,058
Leased plantations.. .. .	—	57	—	—	—	57
Rent of quarters	22	5	5	6	—	38
TOTAL	10,835	2,078	4,366	2,413	55	19,747
<i>Deduct</i> value of produce brought forward	1,351	519	562	552	—	2,984
BALANCE	9,484	1,559	3,804	1,861	55	16,763
<i>Add</i> value of produce carried forward	447	—	609	33	—	1,089
TOTAL	9,931	1,559	4,413	1,894	55	17,852

REVENUE TO THE NEAREST £

	<i>Kidichi</i>	<i>Selem</i>	<i>Mtoni</i>	<i>Chukwani</i>	<i>Jendele</i>	<i>Total</i>
	£	£	£	£	£	£
<i>Personal Emoluments:</i>						
Headquarters staff	1,063	171	475	189	—	1,898
Field staff	1,782	469	393	283	—	2,927
TOTAL PERSONAL EMOLUMENTS	2,845	640	868	472	—	4,825
<i>Other Charges:</i>						
Transport and Travelling	115	52	25	34	22	248
Materials and tools	67	16	12	8	—	103
Labour	9,177	2,000	2,383	2,165	664	16,389
Repairs to buildings	298	44	351	51	—	744
Fuel and maintenance of vehicles	233	117	59	58	—	467
TOTAL	9,890	2,229	2,830	2,316	686	17,951
<i>Deduct</i> capital expenditure by Forest Officer	—	—	—	—	535	535
TOTAL OTHER CHARGES	9,890	2,229	2,830	2,316	151	17,496
<i>Add</i> outstandings valued at	40	20	10	10	—	80
TOTAL OTHER CHARGES	9,930	2,249	2,840	2,326	151	17,496
TOTAL EXPENDITURE	12,775	2,889	3,708	2,798	151	22,321
Profit	—	—	705	—	—	705
Loss	2,844	1,330	—	904	96	5,174

Nett loss — £4,469

Distribution of Planting Material

Areca nut, seedlings	..	..	..	nos.	155
Avocado pear, grafted	..	..	..	"	42
Cassava, cuttings	..	..	..	"	52,950
Chillie, seedlings	..	..	..	"	190,149
Cinnamon, seedlings	..	..	..	"	4
Clove, seedlings	..	..	..	"	482,371
Coconut, seedlings	..	..	..	"	105,971
Coffee, seedlings	..	..	..	"	24,819
Cowpeas, seed	..	..	..	lb.	2
Derris, rooted cuttings	..	..	..	nos.	1,810
Durian, seedlings	..	..	..	"	78
<i>Eugenia javanica</i> , marcotts	..	..	..	"	36
<i>Eugenia javanica</i> , seedlings	..	..	..	"	57
<i>Eugenia uniflora</i> , seedlings	..	..	..	"	3
Grapefruit, budded	..	..	..	"	176
Green gram, seed	..	..	..	lb.	7
Guava, seedlings	..	..	..	nos.	11
Kapok, seedlings	..	..	..	"	1,283
Lemon, smooth, budded	..	..	..	"	30
Lime, budded	..	..	..	"	3,737
„ seedlings	..	..	..	"	184
„ sweet, budded	..	..	..	"	32
Litchi, marcotts	..	..	..	"	76
Maize, seed	..	..	..	lb.	198
Mandarin, budded	..	..	..	nos.	164
Mango, grafted	..	..	..	"	247
Nutmeg, seedlings	..	..	..	"	85
Orange, budded	..	..	..	"	2,338
Pawpaw, seedlings	..	..	..	"	276
Pepper, rooted cuttings	..	..	..	"	150
Pineapple, suckers	..	..	..	"	14,820
Pomelo, budded	..	..	..	"	14
Rambutan, marcotts	..	..	..	"	15
„ seedlings	..	..	..	"	349
Rice, seed	..	..	..	lb.	44
Sapodilla, marcotts	..	..	..	nos.	61
„ seedlings	..	..	..	"	86
Soursop, seedlings	..	..	..	"	23
Sweet potato, vines	..	..	..	"	15,000
Yam, tubers	..	..	..	lb.	4,910

Domestic Exports, 1958

<i>Items</i>	<i>Unit of quantity</i>	<i>Quantity</i>	<i>Value</i>	<i>Percentage of Total value</i>
Cloves	cental of 100 lb.	204,033 ..	2,656,795 ..	66.51
Clove bud and stem oil ..	lb. ..	205,351 ..	68,484 ..	1.71
Copra	ton ..	9,989 ..	610,138 ..	15.27
Coconuts	cwt. ..	99,052 ..	127,695 ..	3.20
Oil cake	„ ..	57,840 ..	57,558 ..	1.44
Soap, common and toilet	„ ..	52 ..	179 ..	—
Coconut oil	„ ..	66,667 ..	340,403 ..	8.52
Chillies	„ ..	908 ..	7,173 ..	0.18
Fruit, fresh	„ ..	1,480 ..	1,668 ..	0.04
Lime juice	imp. gallons ..	112 ..	48 ..	—
Beche-de-mer	„ ..	398 ..	5,300 ..	0.13
Tobacco, unmanufactured	lb. ..	1,440 ..	60 ..	—
Ox hides	cwt. ..	818 ..	5,662 ..	0.14
Skins, sheep and goats ..	„ ..	208 ..	1,466 ..	0.04
Livestock	no. ..	20 ..	80 ..	—
Forest products	value ..	— ..	689 ..	0.02
Kapok	cwt. ..	No export ..	No export ..	—
Coir fibre, unmanufactured	ton ..	2,425 ..	67,762 ..	1.70
Coir fibre, manufactured	„ ..	60 ..	3,692 ..	0.09
Shells, marine	cwt. ..	5,254 ..	18,833 ..	0.47
Fish, dried or salted ..	„ ..	102 ..	1,251 ..	0.03
Fish, fresh	„ ..	27 ..	887 ..	0.02
Lime	„ ..	16,383 ..	6,465 ..	0.16
Seaweed	ton ..	40 ..	2,235 ..	0.06
Other unclassified natural products	„ ..	— ..	10,113 ..	0.25
TOTAL		..	<u>3,994 636</u>	<u>100.0</u>

Approximate Production of Cloves in Frasila of 35 lb. for Thirty-five Crop Years

(Based on receipts of cloves at the Central Market and C.G.A.)

Season	Zanzibar Frasila	Pemba Frasila	Total Frasila	Mean crop per season in 5-year periods Frasila
1923/24	75,027	236,767	311,794	—
1924/25	240,952	520,490	761,442	—
1925/26	219,192	392,622	611,814	—
1926/27	203,843	529,186	733,029	—
1927/28	190,370	500,382	690,752	621,766
1928/29	74,828	125,740	200,568	599,521
1929/30	318,647	610,296	928,943	633,021
1930/31	51,796	201,320	253,116	561,281
1931/32	175,070	760,786	935,856	601,847
1932/33	242,772	244,594	487,366	561,170
1933/34	146,098	781,090	927,188	706,494
1934/35	360,037	503,415	863,452	693,395
1935/36	65,938	232,571	298,509	702,474
1936/37	45,096	351,568	396,664	592,636
1937/38	446,500	909,416	1,355,916	768,346
1938/39	39,879	115,211	155,090	613,926
1939/40	168,041	501,474	669,515	575,139
1940/41	146,323	575,277	721,600	659,757
1941/42	297,578	889,550	1,187,128	817,850
1942/43	40,049	223,691	263,740	599,414
1943/44	263,423	777,218	1,040,641	776,525
1944/45	200,417	459,396	659,813	774,584
1945/46	26,493	161,075	187,568	667,778
1946/47	170,280	924,329	1,094,609	649,074
1947/48	30,914	280,986	311,900	658,906
1948/49	81,700	310,971	392,671	549,312
1949/50	153,888	430,253	584,141	514,178
1950/51	158,588	1,081,786	1,240,374	724,739
1951/52	45,892	290,007	335,899	572,977
1952/53	91,417	82,328	173,745	545,366
1953/54	179,883	1,101,302	1,281,185	723,069
1954/55	97,944	448,927	546,871	715,615
1955/56	139,132	746,093	885,225	644,585
1956/57	117,068	330,437	447,541	666,913
1957/58	220,803	1,327,664	1,548,467	941,858
Average for 35 Seasons	157,882	513,093	670,975	—

Monthly and Annual Rainfall Totals for the Year 1958, for Stations in Zanzibar and Pemba

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 1958	Total 1957
Kigomasha ..	0.29	1.31	0.66	11.56	12.45	7.29	3.13	2.70	6.48	1.50	1.28	3.53	52.18	69.86
	7	2	3	17	16	15	14	19	19	9	3	15	139	163
Matangatwani ..	0.29	1.09	6.08	11.46	11.98	5.23	2.91	2.42	2.22	0.09	2.17	6.33	52.27	82.40
	4	4	12	23	21	17	12	10	11	2	7	12	135	189
Wete ..	0.27	0.59	3.95	16.51	7.76	8.60	3.30	1.60	1.79	0.40	1.93	6.10	52.80	83.71
	2	3	6	22	13	15	10	10	4	3	5	12	105	140
Mkoani ..	0.14	0.65	5.87	13.30	13.73	9.00	2.60	1.94	0.90	1.38	3.67	4.46	57.64	89.87
	2	1	10	16	15	18	10	3	3	3	13	16	110	113
Mkokotoni ..	—	1.82	5.00	3.94	4.50	3.44	2.05	4.05	4.00	3.10	5.79	8.54	46.23	118.17
	—	3	8	9	9	5	5	10	12	5	9	12	87	127
Mtambile ..	1.25	1.49	3.63	18.48	9.80	10.24	2.68	2.40	4.26	3.48	4.77	7.73	70.21	92.28
	5	4	11	20	14	20	9	7	7	7	10	18	132	139
Wesha ..	0.65	0.30	6.11	17.88	9.94	7.23	2.41	2.57	1.39	1.34	1.47	5.08	56.37	72.91
	5	3	13	25	19	19	12	14	6	7	12	17	152	157
Mkwajuni ..	0.21	1.47	6.27	8.26	4.69	2.86	1.22	2.57	4.92	1.28	0.85	6.05	40.65	81.04
	6	4	13	16	16	15	8	10	10	4	3	8	113	164
Limbani ..	0.21	0.56	6.00	11.13	8.79	8.43	1.81	1.76	1.90	0.40	0.75	6.88	48.62	83.99
	4	3	13	22	18	24	8	4	3	2	2	14	117	154
Ole ..	0.67	1.03	5.02	13.65	9.71	6.81	2.30	1.23	1.72	0.37	1.00	3.65	47.16	76.18
	3	4	11	20	17	15	12	10	3	3	76	12	116	136
Chambani ..	0.35	2.32	3.34	13.14	10.41	6.88	1.85	1.69	1.18	0.26	0.14	4.34	45.90	79.09
	1	3	9	16	14	15	6	6	5	2	2	9	88	131

